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Flexible Regional Emissions Data System (FREDS) Documentation for the 1980 NAPAP (National Acid Precipitation Assessment Program) Emissions Inventory

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FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS) DOCUMENTATION FOR THE 1980 NAPAP EMISSIONS INVENTORY

by

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U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711

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National Acid Precipitation Assessment Program

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16. ABSTRACT

The report documents the development of the Flexible Regional Emissions Data System (FREDS) for the 1980 NAPAP Emissions Inventory. FREDS extracts emissions data, pertinent modeling parameters (e.g., stack height, exhaust gas temperature), and source identification information and applies appropriate temporal, spatial, and pollutant species allocation factors to derive a gridded, speciated, and temporally resolved emissions file suitable as input to regional-scale atmospheric simulation models (e.g., Regional Acid Deposition Model, Regional Oxidant Model). FREDS consists of five main modules (i.e., Model Data Extraction Module, Temporal Allocation Module, Speciation Module, Spatial Allocation Module, and Model Input Preprocessor) which are used to apply allocation factors to the annual emissions data, plus peripheral software used to ensure the quality of (and maintain) the allocation factor files. Separate programs are used to process point and area sources. The modules can be implemented in a logical sequence or independently of the others. In addition, FREDS has been designed in a modular fashion, facilitating future modifications to the system. FREDS and associated peripheral software are written in the language of the Statistical Analysis System (SAS) and are installed on EPA's National Computer Center's IBM 3090.

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Emission	Mathematical Models	Stationary Sources	14G	12A
Inventories		Flexible Regional Emissions Data Systems	15E	
Information Systems			09B	
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ABSTRACT

This report documents the development of the Flexible Regional Emissions Data System (FREDS) for the 1980 NAPAP Emissions Inventory. FREDS extracts emissions data, pertinent modeling parameters (e.g., stack height, exhaust gas temperature, etc.) and source identification information and applies appropriate temporal, spatial, and pollutant species allocation factors to derive a gridded, speciated, and temporally resolved emissions file suitable as input to regional scale atmospheric simulation models (such as the Regional Acid Deposition Model and Regional Oxidant Model). FREDS consists of five main modules which are used to apply allocation factors to the annual emissions data, plus peripheral software used to ensure the quality of and maintain the allocation factor files. Separate programs are used to process point and area sources. The five primary modules are the Model Data Extraction Module, the Temporal Allocation Module, the Speciation Module, the Spatial Allocation Module, and the Model Input Preprocessor. The modules can be implemented in a logical sequence or independently of the others. In addition, FREDS has been designed in a modular fashion, facilitating any future modifications to the system. FREDS and associated peripheral software are written in the language of the Statistical Analysis System (SAS) and are installed on EPA's National Computer Center's IBM 3090.

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This report describes the development of the Flexible Regional Emissions Data System, a project administered by the U.S. Environmental Protection Agency (EPA) with funding from the National Acid Precipitation Assessment Program (NAPAP) Task Group on Emissions and Controls. David J. Beecy of the U.S. Department of Energy serves as chairman of this task group, and Edward C. Trexler (DOE) serves as deputy chairman.

The project has been a cooperative effort involving personnel from both the EPA Office of Research and Development (ORD) and the EPA Office of Air Quality Planning and Standards (OAQPS). Donald Neal and Andrew Ackerman were primarily responsible for the design and coding of FREDS software. In addition, Joan Novak of EPA's Atmospheric Sciences Research Laboratory provided valuable support and guidance.

EXECUTIVE SUMMARY

BACKGROUND

The National Acid Precipitation Assessment Program (NAPAP), was established by Congress in 1980 to coordinate and expand research on problems posed by acid deposition in and around the United States. The program is managed through the Interagency Task Force on Acid Precipitation which coordinates eight task groups having specific technical responsibilities. The Task Group on Emissions and Controls is charged with development of comprehensive and accurate inventories of emissions from sources thought to be important in acid deposition processes. To fulfill its stated objective and to support other related NAPAP research, the Task Group on Emissions and Controls has generated a number of major emissions data bases using 1980 as the base year.

Processing of the 1980 NAPAP Emissions Inventories required the design of an emissions data handling system - the Flexible Regional Emissions Data System (FREDS). The primary focus of these inventories is the fulfillment of the emissions data requirements for development and testing of the Eulerian Regional Acid Deposition Model (RADM). In addition, emissions data are also used to support applications of the Regional Oxidant Model (ROM).

To support development and testing of these models, the 1980 Annual Inventory (Version 5.0) was resolved temporally, spatially, and by component species using the Flexible Regional Emissions Data System (FREDS). An Eulerian modeling emissions inventory (Version 5.2) and an oxidant modeling emissions inventory (Version 5.3) were created. The temporal, spatial, and species resolution of the emissions data bases are summarized in the accompanying table. Annual emissions were allocated to the hourly level for a typical weekday, Saturday, and Sunday in each season (12 temporal scenarios); county-level area sources and major and minor point sources were spatially resolved to modeling grid cells; TSP emissions were assigned to alkalinity classes; NO_x emissions were split into NO and NO_2 constituents; and THC emissions were apportioned into as many as 28 photochemical reactivity classes.

To create the 1980 NAPAP Modeling Emissions Inventories, FREDS requires input files of temporal, spatial, and pollutant species allocation factors. The development of these factors is documented in separate reports. FREDS was also used to generate a SAS version of the 5.0 NAPAP Emissions Inventory for incorporation into the Acid Deposition Data Network (ADDNET).

1980 NAPAP EMISSIONS INVENTORY COVERAGE

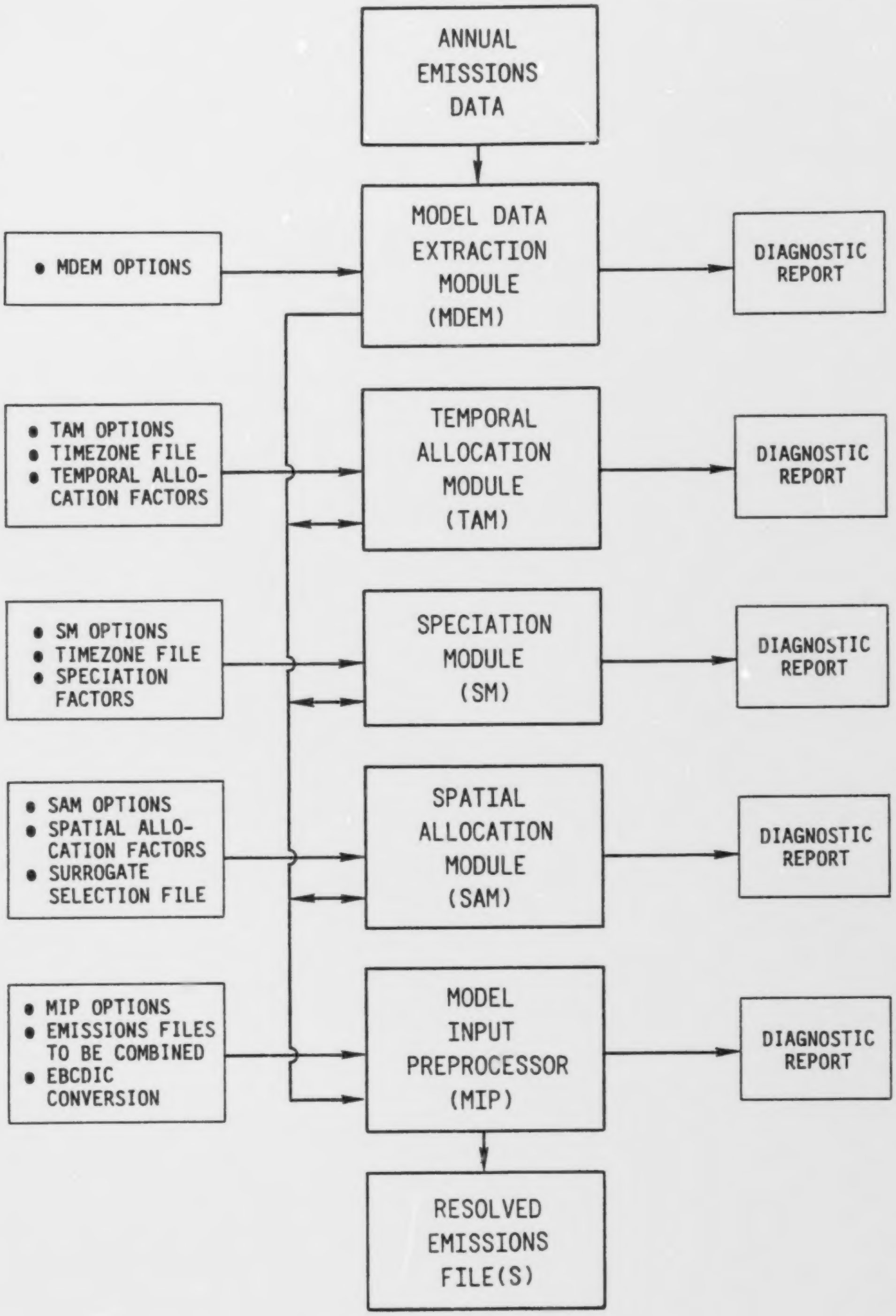
	Annual Emissions Inventory Version 5.0	Eulerian Model Emissions Inventory Version 5.2	Oxidant Model Emissions Inventory Version 5.3
Temporal resolution	Annual/seasonal	Hourly emissions values for typical weekday, Saturday, and Sunday for all four seasons	
Geographic domain and resolution	48 contiguous states and Canada; area sources at the county level	48 states and Canada; separate major point source file with minor point sources and area sources assigned to 20 x 20 km grid cells	
Anthropogenic point sources	Stationary sources emitting 100 or more tons of criteria pollutants in 1980		
Anthropogenic area sources	Stationary sources emitting less than 100 tons of criteria pollutants in 1980 and area sources		
Pollutants	SO_2, SO_4, TSP, Pb, CO, HCl, HF, NO_x, NH_3, VOC, total hydrocarbons (THC)	SO_2, SO_4, TSP (Ca, Mg, K, Na), Pb, CO, HCl, HF, NO, NO_2, NH_3, VOC, THC (methane, ethane, ethylene, propane, propylene, N-butane, 1,2-butane, isobutene, trans-2-butene, pentane, isopentane, 2,3-dimethylbutane, other alkenes, other alkanes, formic acid, acetic acid, other organic acids, formaldehyde, acetaldehyde, propionaldehyde, acetone, other ketones, other aldehydes, xylene, benzene, toluene, ethylbenzene, other aromatics)	SO_2, SO_4, TSP (Ca, Mg, K, Na), Pb, CO, HCl, HF, NO, NO_2, NH_3, VOC, THC (methane, paraffins, ethylene, olefins, formaldehyde, other aldehydes, toluene, xylene, isoprene, nonreactives)

FREDS OVERVIEW

The Flexible Regional Emissions Data System is a software system designed to produce an emissions inventory suitable for input to regional acid deposition models. FREDS extracts emissions data, pertinent modeling parameters (e.g., stack height, exhaust gas temperature, etc.) and source identification information from EIS Master File records or preprocessed SAS files and applies appropriate temporal, spatial, and pollutant species allocation factors to derive a gridded, speciated, and temporally resolved emissions file suitable as input to a regional scale atmospheric simulation model. FREDS for the 1980 NAPAP Emissions Inventory consists of five main modules which are used to apply allocation factors to the annual emissions data, plus peripheral software used to quality assure and maintain the allocation factor files. Separate programs are used to process point and area sources. The five primary modules are the Model Data Extraction Module (MDEM), the Temporal Allocation Module (TAM), the Speciation Module (SM), the Spatial Allocation Module (SAM), and the Model Input Preprocessor (MIP). For final processing, the SAS formatted MIP output is converted to EBCDIC characters. An overview of FREDS modules is presented in the accompanying figure. Each module can be implemented in a logical sequence or independently of the others. To maximize flexibility, FREDS allows user definition of up to 15 pollutant emissions and their identities, (referenced by Storage and Retrieval of Aerometric Data (SAROAD) pollutant code), the temporal scenario, spatial grid origin and grid cell size, and the number and relationship of pollutant subspecies. Grid definition is specified in a user generated Spatial Allocation Module Control Options File. To speciate emissions for various chemical mechanisms or pollutant subclasses, the user inputs the requested classes using files containing the desired speciation factors. In addition, FREDS has been designed in a modular fashion, facilitating any future modifications to the system. FREDS and associated peripheral software are written in the command language of the Statistical Analysis System (SAS) and are installed on the National Computer Center's IBM 3090.

OBJECTIVES

The primary objectives of this report are to document the implementation of FREDS software for the development of the 1980 NAPAP Emissions Inventories and to provide the user with the necessary specifications for execution of FREDS modules. Input/Output formats are also supplied for all files based on the module executions presented in Section 2. Allocation factor development has been documented in "Development of the 1980 NAPAP Emissions Inventory",[1] "National Acid Precipitation Assessment Program Emission Inventory Allocation Factors",[2] and "Documentation of Spatial Allocation Procedures for the 1980 NAPAP Emissions Inventory".[3] Interested readers should refer to these documents.


ANNUAL EMISSIONS DATA
MDEM OPTIONS
MODEL DATA EXTRACTION MODULE (MDEM)
DIAGNOSTIC REPORT
TAM OPTIONS
TIMEZONE FILE
TEMPORAL ALLOCATION FACTORS
TEMPORAL ALLOCATION MODULE (TAM)
DIAGNOSTIC REPORT
SM OPTIONS
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DIAGNOSTIC REPORT
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SURROGATE SELECTION FILE
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EMISSIONS FILES TO BE COMBINED
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MODEL INPUT PREPROCESSOR (MIP)
DIAGNOSTIC REPORT
RESOLVED EMISSIONS FILE(S)

REPORT ORGANIZATION

FREDS is comprised of the following sections:

- Introduction
- System Charts
- Detailed Program Description
- Input/Output Format Description
- Control Statements
- Operating Instructions
- Environment
- Example Speciation Module Run and Description.

CONCLUSIONS

The FREDS software provides versatile and powerful computer programs to allocate emission inventory data into various levels of spatial, temporal, and species resolution. The system was used successfully in a first of a kind application to process the 1980 NAPAP Emissions Inventory into data bases to support the specific requirements of acid deposition and photochemical oxidant atmospheric models. The documentation of the programs in accordance with EPA's automatic data processing standards ensures that it will be a useful tool for future applications.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AQCR - Air Quality Control Region
COF - Control Options File
EIS - Emissions Inventory System
EISSCC - Emissions Inventory System Source Classification Code
EISSIC - Emissions Inventory System Standard Industrial Classification
FREDS - Flexible Regional Emissions Data System
GMT - Greenwich Mean Time
JCL - Job Control Language
MDEM - Model Data Extraction Module
MIP - Model Input Preprocessor
NCC - National Computer Center
PSPLIT - Pollutant Splits System
RADM - Regional Acid Deposition Model
ROM - Regional Oxidant Model
SAF - Spatial Allocation Factor
SAFF - Spatial Allocation Factor File
SAFP - Spatial Allocation Factor Preprocessor
SAM - Spatial Allocation Module
SAROAD - Storage and Retrieval of Aerometric Data
SAS - Statistical Analysis System
SCC - Source Classification Code
SFF - Speciation Factor File
SIC - Standard Industrial Classification
SM - Speciation Module
SSF - Surrogate Selection File
TAF - Temporal Allocation Factor
TAFF - Temporal Allocation Factor File
TAFP - Temporal Allocation Factor Preprocessor
TAM - Temporal Allocation Module
TZF - Time Zone File

BACKGROUND

The National Acid Precipitation Assessment Program (NAPAP) was established by Congress in 1980 to coordinate and expand research on problems posed by acid deposition in and around the United States. The program is managed through the Interagency Task Force on Acid Precipitation which coordinates eight task groups having specific technical responsibilities. The Task Group on Emissions and Controls is charged with development of comprehensive and accurate inventories of emissions from sources thought to be important in acid deposition processes. To fulfill its stated objective and to support other related NAPAP research, the Task Group on Emissions and Controls has generated a number of major emissions data bases using 1980 as the base year.

Processing of the 1980 NAPAP Emissions Inventories required the design of an emissions data handling system - the Flexible Regional Emissions Data System (FREDS).

PROJECT SUMMARY

The primary focus of the 1980 NAPAP Emissions Inventory is the fulfillment of the emissions data requirements for development and testing of the Eulerian Regional Acid Deposition Model (RADM). Within EPA's Office of Research and Development, the Atmospheric Sciences Research Laboratory (ASRL) has been assigned lead responsibility for developing the RADM. The National Center for Atmospheric Research (NCAR) has been assigned the task of developing the model framework which includes a number of chemical transformation modules. In addition, emissions data are also used to support applications of the Regional Oxidant Model (ROM).

To support development and testing of these models, one of the most extensive applications of the NAPAP Emissions Inventory, the 1980 Annual Inventory (Version 5.0) had to be resolved temporally, spatially, and by component species to create an Eulerian modeling emissions inventory (Version 5.2) and an oxidant modeling emissions inventory (Version 5.3). The temporal, spatial, and species resolution of the emissions data bases are summarized in Table 1-1. Annual emissions were allocated to the hourly level for a typical weekday, Saturday, and Sunday in each season (12 temporal scenarios); county-level area sources and major and minor point sources were spatially resolved to modeling grid cells; TSP emissions were assigned to alkalinity classes; NO_x emissions were split into NO and NO_2 constituents; and THC emissions were apportioned into as many as 28 photochemical reactivity classes.

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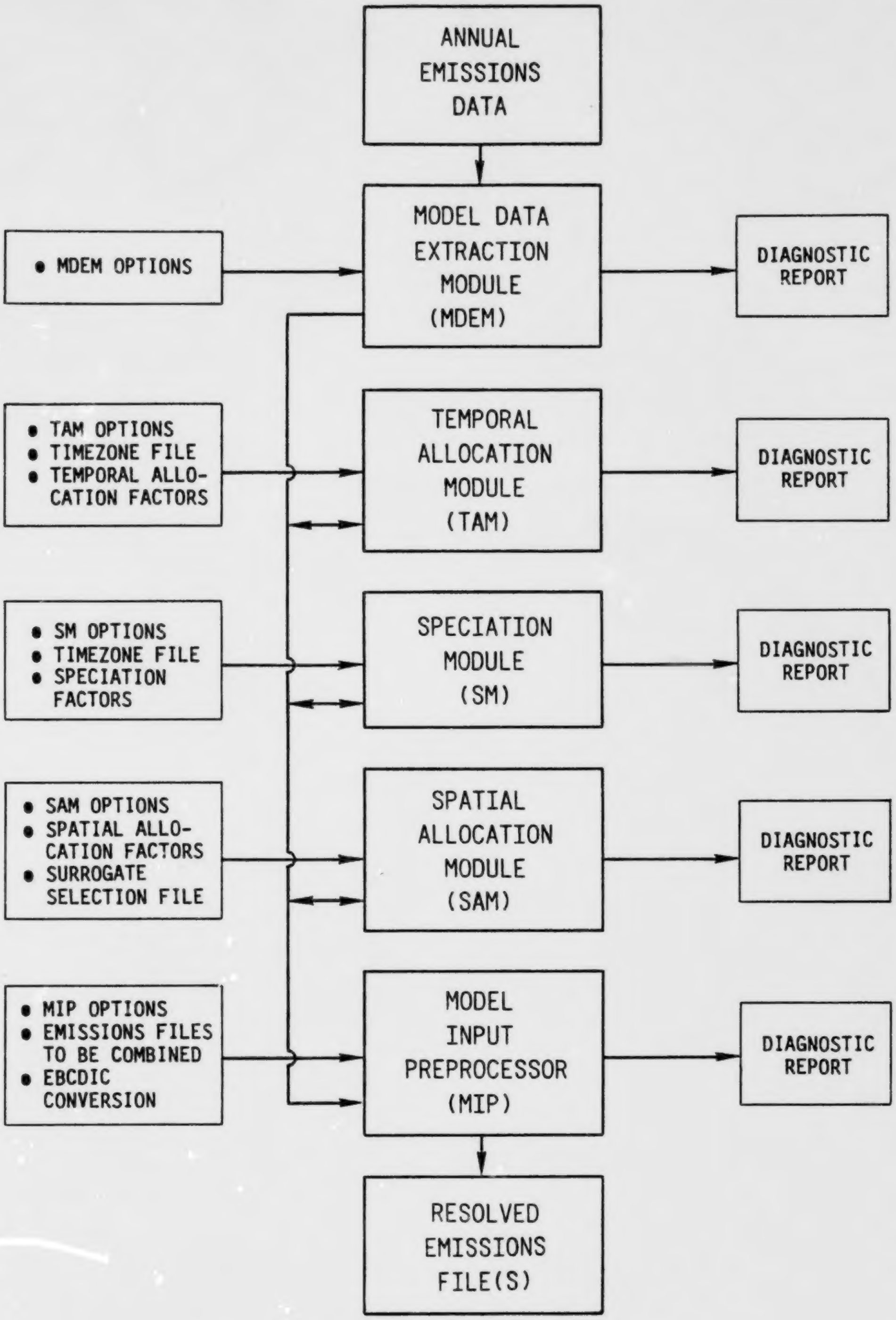
To create the 1980 NAPAP Modeling Emissions inventories, temporal, spatial, and pollutant species allocation factors were developed and applied to the Version 5.0 data base. Allocation factor development has been documented in "Development of the 1980 NAPAP Emissions Inventory",[1] "National Acid Precipitation Assessment Program Emission Inventory Allocation Factors",[2] and "Documentation of Spatial Allocation Procedures for the 1980 NAPAP Emissions Inventory".[3] Interested readers should refer to these documents, as allocation factor development will not be covered by this report. The FREDS was also used to generate a SAS version of the 5.0 NAPAP Emissions Inventory for incorporation into the Acid Deposition Data Network (ADDNET).

FREDS OVERVIEW

The Flexible Regional Emissions Data System (FREDS) is a software system designed to produce an emissions inventory suitable for input to regional acid deposition models. FREDS extracts emissions data, pertinent modeling parameters (e.g., stack height, exhaust gas temperature, etc.) and source identification information from EIS Master File records or preprocessed SAS files and applies appropriate temporal, spatial, and pollutant species allocation factors to derive a gridded, speciated, and temporally resolved emissions file suitable as input to a regional scale atmospheric simulation model. FREDS for the 1980 NAPAP Emissions Inventory consists of five main modules which are used to apply allocation factors to the annual emissions data, plus peripheral software used to quality assure and maintain the allocation factor files. Separate programs are used to process point and area sources. The five primary modules are the Model Data Extraction Module (MDEM), the Temporal Allocation Module (TAM), the Speciation Module (SM), the Spatial Allocation Module (SAM), and the Model Input Preprocessor (MIP). For final processing, the SAS formatted MIP output is converted to EBCDIC characters. An overview of FREDS modules is presented in Figure 1-1. Each module can be implemented in a logical sequence or independently of the others. To maximize flexibility, FREDS allows user definition of up to 15 pollutant emissions and their identities (referenced by SAROAD code), the temporal scenario, spatial grid origin and grid cell size, and the number and relationship of pollutant subspecies. Grid definition is specified in a user generated Spatial Allocation Module Control Options File. To speciate emissions for various chemical mechanisms or pollutant subclasses, the user inputs the requested classes using files containing the desired speciation factors. In addition, FREDS has been designed in a modular fashion, facilitating any future modifications to the system. FREDS and associated peripheral software are written in the command language of the Statistical Analysis System (SAS) and are installed on the National Computer Center's IBM 3090.


ANNUAL EMISSIONS DATA
• MDEM OPTIONS
MODEL DATA EXTRACTION MODULE (MDEM)
DIAGNOSTIC REPORT
• TAM OPTIONS
• TIMEZONE FILE
• TEMPORAL ALLOCATION FACTORS
TEMPORAL ALLOCATION MODULE (TAM)
DIAGNOSTIC REPORT
• SM OPTIONS
• TIMEZONE FILE
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SPECIATION MODULE (SM)
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• EMISSIONS FILES TO BE COMBINED
• EBCDIC CONVERSION
MODEL INPUT PREPROCESSOR (MIP)
DIAGNOSTIC REPORT
RESOLVED EMISSIONS FILE(S)

Figure 1-1. FREDS Overview.

OBJECTIVES

The primary objectives of this report are to document the implementation of FREDS software for the development of the 1980 NAPAP Emissions Inventories and to provide the user with the necessary specifications for execution of FREDS modules. Input/Output formats are also supplied for all files based on the module executions presented in Section 2.

REPORT ORGANIZATION

The report organization follows the following guidelines:

- EPA Management Information and Data Systems Division Automatic Data Processing System Documentation
- AEERL-Office of Research and Development Handbook for Report Preparation
- OAQPS-National Air Data Branch Documentation Standards.

Based on the above guidelines, the remainder of this document is comprised of the following sections:

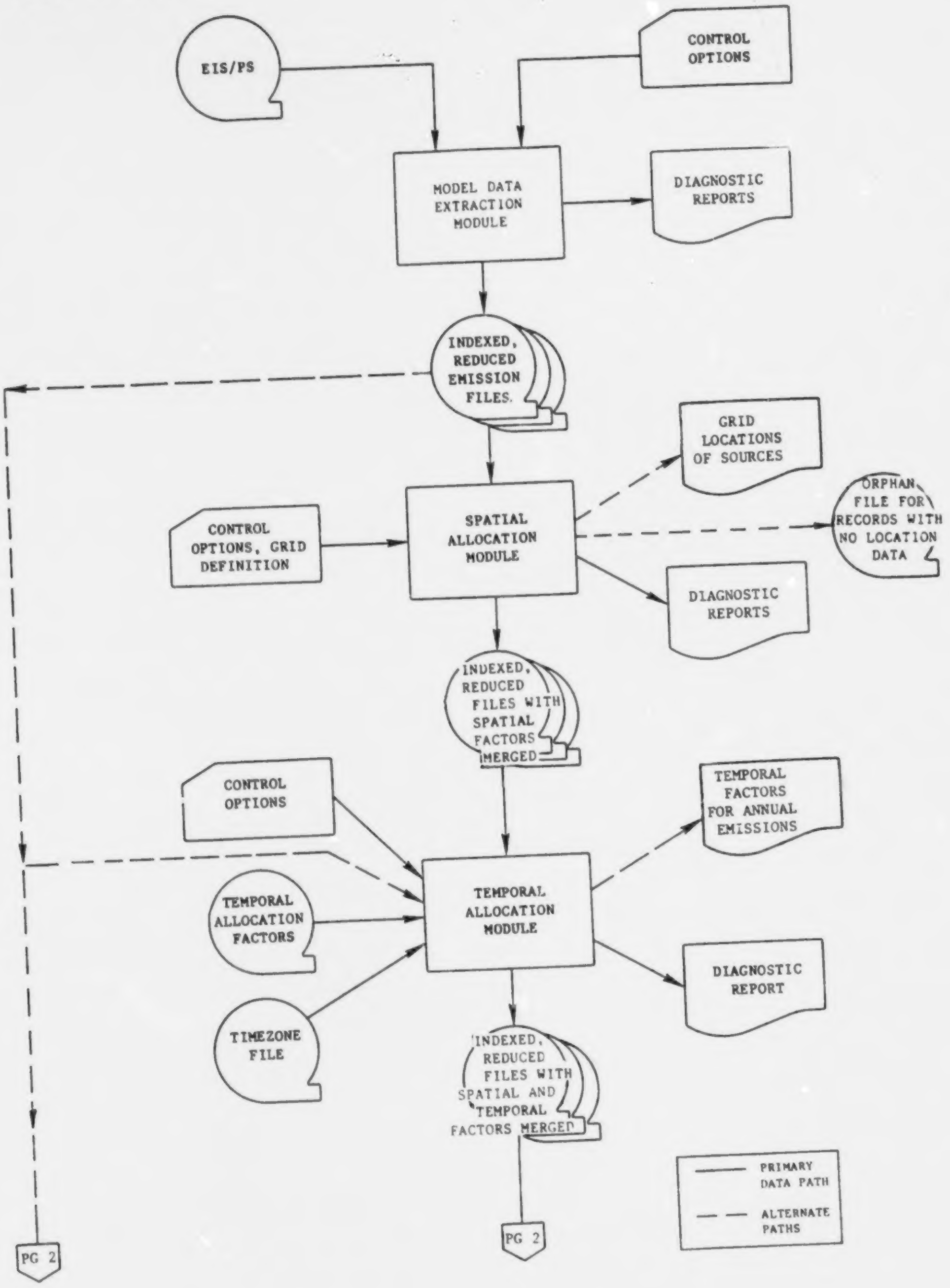
- System Charts
- Detailed Program Description
- Input/Output Format Description
- Control Statements
- Operating Instructions
- Environment
- Example Speciation Module Run and Description.

SECTION 2

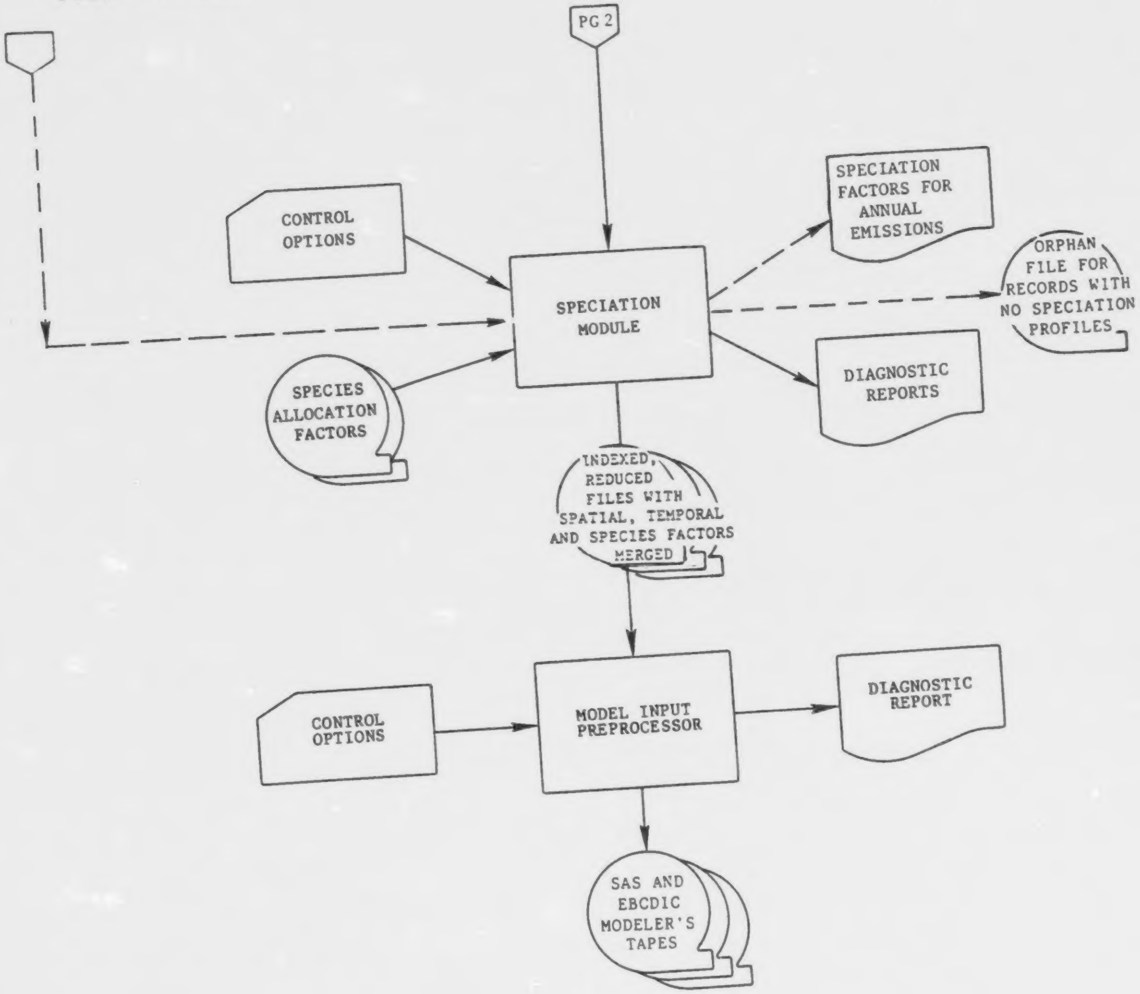
SYSTEM CHARTS

The system flow charts for the Flexible Regional Emissions Data System point and area source processing are presented in this section. The diagrams illustrate the five main FREDS modules--Model Data Extraction Module (MDEM), Temporal Allocation Module (TAM), Speciation Module (SM), Spatial Allocation Module (SAM), and Model Input Preprocessor (MIP)--and corresponding input and output files. The suggested data paths outlined in each diagram minimize file storage and overhead. For complete and partial emissions processing, MDEM must always be executed first. The order of execution of TAM, SM, and SAM may be interchanged (see alternate paths), however, it is recommended that the user follow the order in the system charts, since interchanging the modules affects run time. This is especially important for area source processing since SAM and TAM execution have the greatest impacts on file size. For complete FREDS processing, MIP must be executed last for both point and area sources. Once MIP is completed, SAS format modeler's tapes may be converted to EBCDIC or ASCII characters.

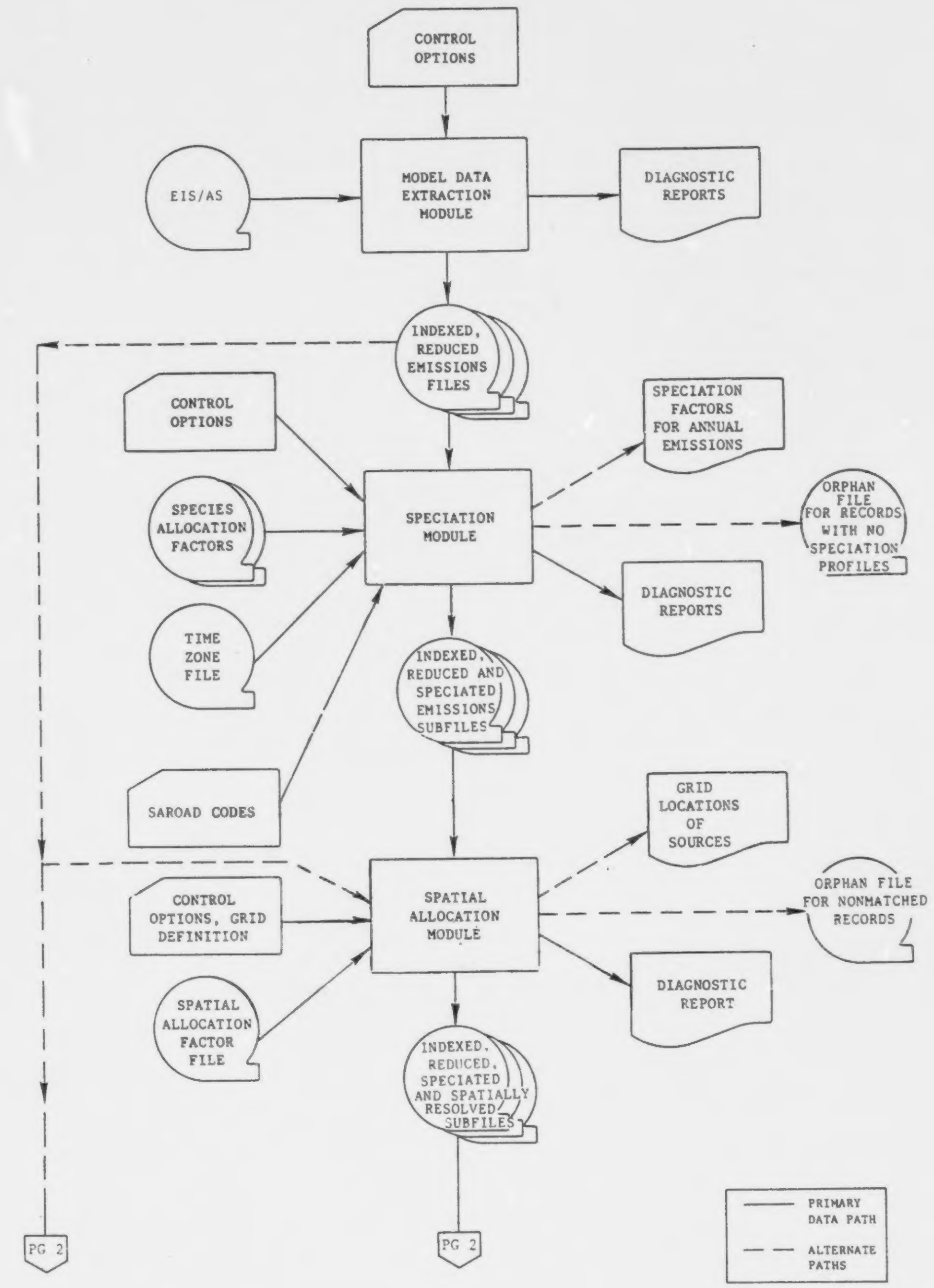
FREDS--Point Sources


EIS/PS
CONTROL OPTIONS
MODEL DATA EXTRACTION MODULE
DIAGNOSTIC REPORTS
INDEXED, REDUCED EMISSION FILES.
GRID LOCATIONS OF SOURCES
ORPHAN FILE FOR RECORDS WITH NO LOCATION DATA
CONTROL OPTIONS, GRID DEFINITION
SPATIAL ALLOCATION MODULE
DIAGNOSTIC REPORTS
INDEXED, REDUCED FILES WITH SPATIAL FACTORS MERGED
CONTROL OPTIONS
TEMPORAL FACTORS FOR ANNUAL EMISSIONS
TEMPORAL ALLOCATION FACTORS
TEMPORAL ALLOCATION MODULE
DIAGNOSTIC REPORT
TIMEZONE FILE
INDEXED, REDUCED FILES WITH SPATIAL AND TEMPORAL FACTORS MERGED
PRIMARY DATA PATH
ALTERNATE PATHS
PG 2
PG 2

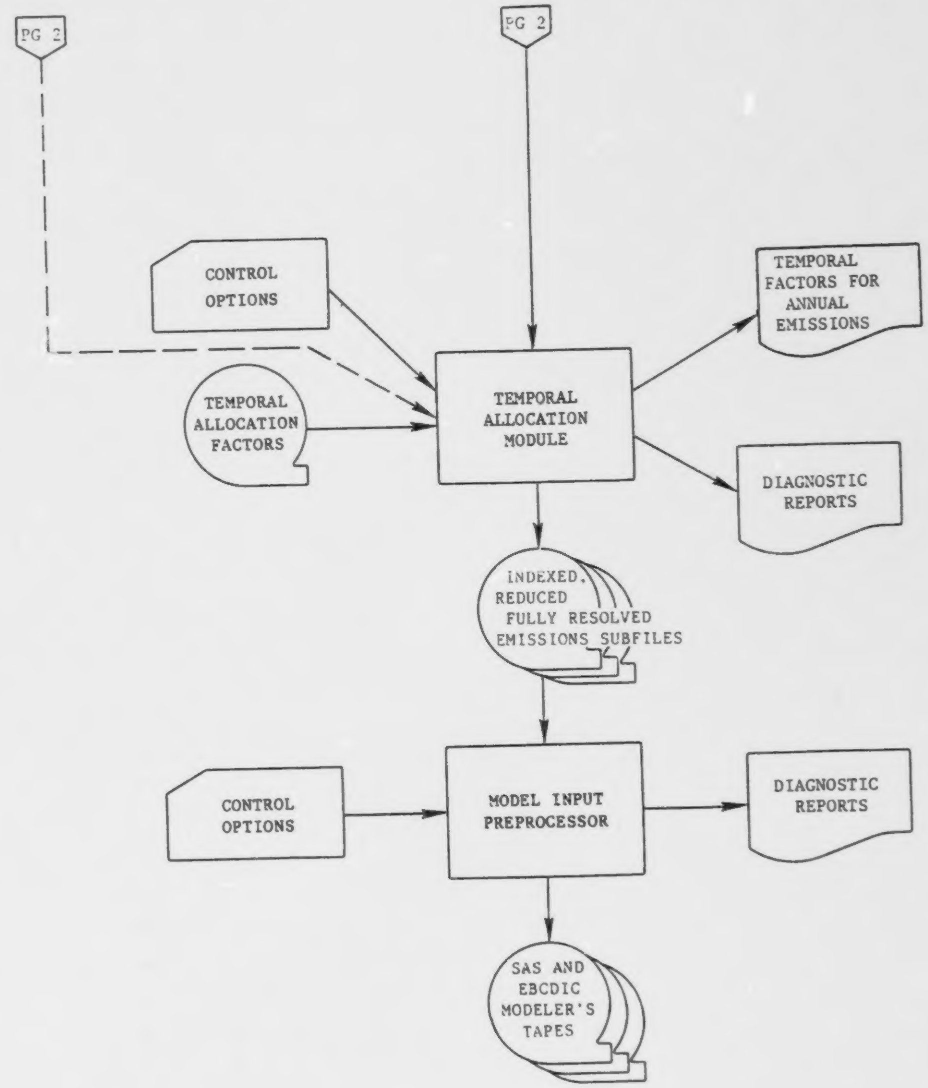
Point Sources


PG 2
CONTROL OPTIONS
SPECIATION MODULE
SPECIATION FACTORS FOR ANNUAL EMISSIONS
ORPHAN FILE FOR RECORDS WITH NO SPECIATION PROFILES
DIAGNOSTIC REPORTS
SPECIES ALLOCATION FACTORS
INDEXED, REDUCED FILES WITH SPATIAL, TEMPORAL AND SPECIES FACTORS MERGED
CONTROL OPTIONS
MODEL INPUT PREPROCESSOR
DIAGNOSTIC REPORT
SAS AND EBCDIC MODELER'S TAPES

FREDS--Area Sources


CONTROL OPTIONS
EIS/AS
MODEL DATA EXTRACTION MODULE
DIAGNOSTIC REPORTS
INDEXED, REDUCED EMISSIONS FILES
CONTROL OPTIONS
SPECIATION FACTORS FOR ANNUAL EMISSIONS
SPECIES ALLOCATION FACTORS
SPECIATION MODULE
ORPHAN FILE FOR RECORDS WITH NO SPECIATION PROFILES
DIAGNOSTIC REPORTS
TIME ZONE FILE
INDEXED, REDUCED AND SPECIATED EMISSIONS SUBFILES
SAROAD CODES
GRID LOCATIONS OF SOURCES
CONTROL OPTIONS, GRID DEFINITION
SPATIAL ALLOCATION MODULE
ORPHAN FILE FOR NONMATCHED RECORDS
SPATIAL ALLOCATION FACTOR FILE
DIAGNOSTIC REPORT
INDEXED, REDUCED, SPECIATED AND SPATIALLY RESOLVED SUBFILES
PRIMARY DATA PATH
ALTERNATE PATHS
PG 2
PG 2

Area Sources


PG 2
PG 2
CONTROL OPTIONS
TEMPORAL ALLOCATION FACTORS
TEMPORAL ALLOCATION MODULE
TEMPORAL FACTORS FOR ANNUAL EMISSIONS
DIAGNOSTIC REPORTS
INDEXED, REDUCED FULLY RESOLVED EMISSIONS SUBFILES
CONTROL OPTIONS
MODEL INPUT PREPROCESSOR
DIAGNOSTIC REPORTS
SAS AND EBCDIC MODELER'S TAPES

SECTION 3

DETAILED PROGRAM DESCRIPTION

The Flexible Regional Emissions Data System (FREDS) consists of five primary independent subsystems used to process pollutant emissions data stored in Emissions Inventory System (EIS) Master File and SAS formats for use in regional scale atmospheric simulation modeling. It includes capabilities to format the fully resolved data for input to Eulerian atmospheric transport models such as the Regional Acid Deposition Model (RADM) and the Regional Oxidant Model (ROM). FREDS software, and associated data files, are installed on the National Computer Center's (NCC) IBM 3090 mainframe computer. The five primary modules consist of programs written in the command language of the Statistical Analysis System (SAS). The modules are used to extract modeling and source identification parameters from point source and area source records, resolve annual emissions totals temporally and spatially and apportion emissions totals for composite species (e.g., NO_x, THC) into individual species or classes. Point and area sources are processed independently utilizing separate source code.

Each of the primary point and area source modules consists of a series of SAS procedures, data steps, and SAS subroutines called macros. The SAS macro facility allows long and detailed programs to be "packaged" and invoked with a single command. Macros can be defined to accept parameters, retain macro variables across SAS steps and conditionally create SAS statements. The result of executing macro program statements is to produce SAS code which is then passed to the SAS supervisor/compiler for execution. A diagnostic report is given at the end of each module, with the level of detail specified by the user.

MODEL DATA EXTRACTION MODULE

The FREDS system interfaces with EIS via the Model Data Extraction Module (MDEM). MDEM will accept either EIS/PS or EIS/AS Master File formatted data or SAS formatted emissions files, and is therefore the primary interface between the NAPAP annual pollutant master files and FREDS. The module creates a condensed point source record for each emissions point or a condensed area source record for each area source category at the county level. MDEM extracts data needed to identify the emissions source and characterize its emissions. If specified by the user, MDEM will separate "major" point sources from "minor" point sources, and will segment the reduced emissions records into logical groups (generally defined by industry) for their subsequent independent processing through the rest of FREDS.

The MDEM is a SAS program made up of subroutines called macros. The main body of the program reads and validates the Control Options File (COF). Also within the main body, macro variables (INDX2, INDX3, and MINOR) used for SIC/SCC and Major/Minor subfile definition are created using the data step macro function SYMPUT. A subroutine or SAS macro, SETUP, is also called from the main body of the program. This routine creates global macro variables for definition of SIC/SCC or Major/Minor Subfiles (SUBDD1-SUBDD50) and executes the appropriate input macros for point or area sources. Once emissions are processed, the subroutine SORTEM is invoked to sort the emissions by EISSCC, State, County, Plant ID, and Point ID for point sources and by EISSCC, State, and County for area sources.

MDEM accepts the following input files:

- Point Source Emissions File (EIS/PS)
- Area Source Emissions File (EIS/AS)
- SAS Format Point Source Emissions File
- SAS Format Area Source Emissions File
- Control Options File (COF)

The primary function of the MDEM is to reduce the volume of emissions data to be processed and to create industry-specific emissions data subfiles for their subsequent independent processing through the remainder of the FREDS system. File size is minimized by dropping all variables not referenced by FREDS. In addition, annual area source pollutants represented by the variables SAROAD1-15 and EMISS1-15, where SAROAD1-15 are the pollutant SAROAD codes for user defined pollutants and EMISS1-15 are the emissions corresponding to the SAROAD codes, are extracted and placed into a total of 15 variables. For example, the pollutant SAROAD code corresponding to TSP (11101) may be found in SAROAD3 and corresponding emissions in EMISS3. MDEM will extract this information, create a variable ATSP, and place the value of EMISS3 in ATSP. This allows the pollutant definition and emissions to be contained in one variable. For point sources, the EIS variables SAROAD1-15 and EMISS1-15 are maintained.

MDEM output includes a diagnostic report providing a record of execution, warning and error messages, a summary of the actions performed (e.g., point or area source records processed, industry subfiles created, etc.) and general accounting information. A hard-copy listing of the condensed emission records is also available. For area sources, the MDEM also outputs annual emissions totals when requested by the user.

The primary products of the MDEM are the following condensed emissions data files and subfiles:

- Point source emissions file
- Major point source subfiles
- Minor point source subfiles
- Area source emissions file
- Point source industry subfiles
- Area source industry subfiles

Extraction of Modeling Parameters

The MDEM accepts point or area source input files. The appropriate MDEM SAS code for source type must be executed. Once the user-defined emissions data are input, the MDEM extracts from each EIS or preprocessed SAS record the essential parameters needed to identify each emissions point or county level area source category and create a reduced emission record. Once the condensed area source records are created for each category (e.g., Solvent Evaporation), a "pseudo SCC" is assigned to each for purposes of matching area source category emissions to the most appropriate temporal, spatial, and species allocation factors (as they are defined by SCC).

The condensed point and area source emission records are sorted by EISSCC, State and County, by the macro SORTEM. Point source records are further sorted by Plant ID and Point ID.

Creation of Major and Minor Point Source Files--

It is anticipated that future modeling applications will require different treatment of major and minor point sources. The MDEM, if requested, will separate condensed emissions files for point sources into major and minor point source subfiles based on user specified emission limits for their independent processing through the remainder of the FREDS system.

The Control Options File provides the major/minor point source selection criteria. The user must enter the pollutant(s) used to distinguish major sources from minor sources, referenced by SAROAD codes, and the appropriate emissions cutoff level (tons/yr) for each. Cutoff criteria apply to emission "points." An emission point will be considered "major" if any of the user selected pollutant thresholds are exceeded. This is accomplished in the subroutine (macro) EISIN; annual point source pollutants are extracted and may be output to major or minor point source subfiles.

Creation of Industry Subfiles--

It is anticipated that some modeling applications will involve the evaluation of various emissions control and growth scenarios. Generally, control and growth (projection) factors are defined by industry group. Based on a user-designated set of SIC/SCC combinations, the MDEM will separate emissions data into industry groups, for both point and area sources, which would correspond to those for which control options and/or growth scenarios were to be evaluated in a particular study. This allows the optional evaluation of various projection scenarios by applying industry-specific control and/or growth factors to the gridded, speciated and temporally resolved data, thus eliminating the need to reprocess the "projected" inventory through the entire system.

The Control Options File and corresponding MDEM code enable the user to specify whether industry subfiles will be created for major and minor point sources or for area sources. The user designates the number of subfiles to be created and the definition (in terms of SIC/SCC) of each. Records that do not meet the SIC/SCC criteria are output to miscellaneous subfiles. Emissions are output to these subfiles in the EISIN macro of the SAS source code for both point and area sources.

Flow Chart and Description

Detailed descriptions of both the point and area source versions of MDEM are illustrated in the accompanying flow charts. An individual "set" of flow charts is presented each for point and area sources. The first diagram of each set represents the overall module flow. Processes depicted by double vertical lines indicate the presence of several subprocesses, and hence a second level of more detailed diagrams are presented for these. For example, the first double-lined process is "READ CONTROL OPTIONS FILE." Starting on the next page, the reader will find a second-level chart with the same name. Double-lined processes here refer to third level subprocesses. On completion of the third level of subprocesses, the user returns to the second level, and then back to the first. The user would then continue on the first level until the next double-lined process is encountered - "MACRO EISIN". Again, the reader refers to a second level diagram. This continues until the reader has encountered all processes depicted on the main module flow chart. The flow charts presented reflect the input for EIS/PS and EIS/AS Master Files.

The first step performed by the MDEM when processing both point and area sources is to read and validate the Control Options File. Each record of the COF is first checked for identification. Based on control record type, the proper input routine is called to read the data, assign values to appropriate variables, increment variable and record counters, and check the data for validity. When the end of the control file is encountered, the COF has been reformatted as a SAS file containing control processing parameters.

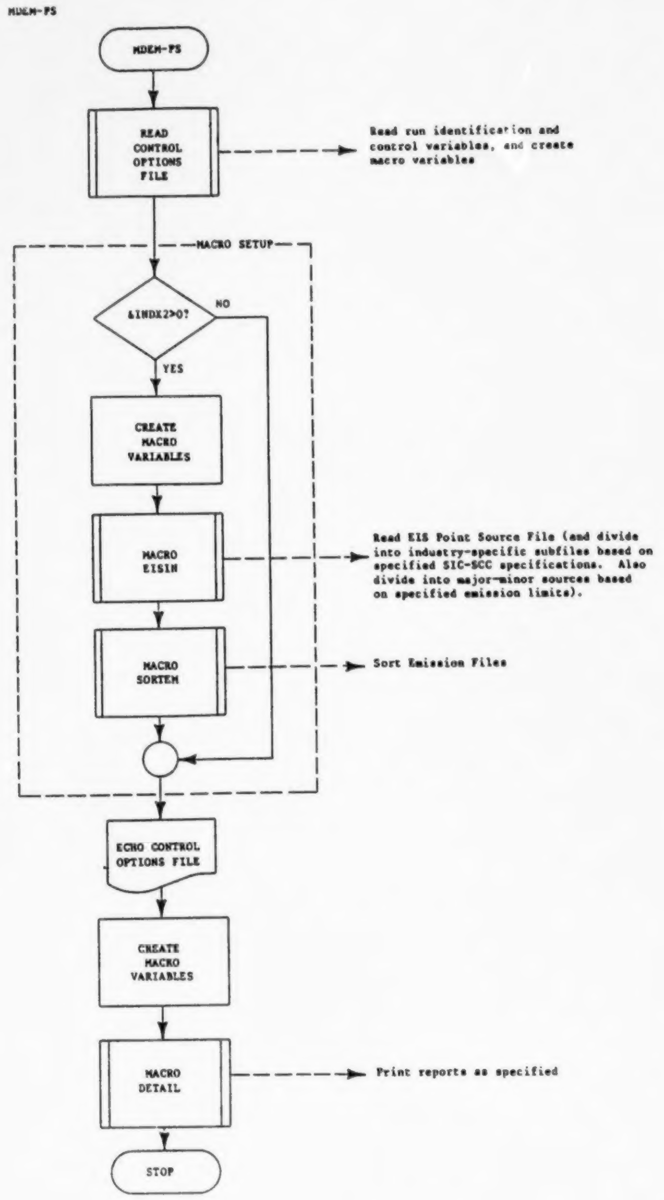
Once the Control Options File has been processed, macro variables used for SIC/SCC and Major/Minor subfile definitions (INDX2, INDX3, and MINOR) and, for area sources, annual pollutant variable names (e.g., ASO_2, ASO_4) are created from the control file variables in the main body of the program. The main program next calls a processing macro, SETUP, to create global macro variables for definition of SIC/SCC or Major/Minor subfiles (SUBDD1-SUBDD50) and to invoke the EISIN and SORTEM macros. The macro EISIN reads the corresponding EIS Master File. For a preprocessed SAS file, this macro is simplified since MDEM is not required to loop over the EIS record structure. Emission records are output in SAS format while unnecessary data are dropped from the data sets. The SORTEM macro is then called to sort the condensed emissions file by EISSCC, State, and County for area sources and by EISSCC, State, County, Plant ID and Point ID, for point sources. After the complete source emissions file has been formed, the MDEM classifies emissions as follows.

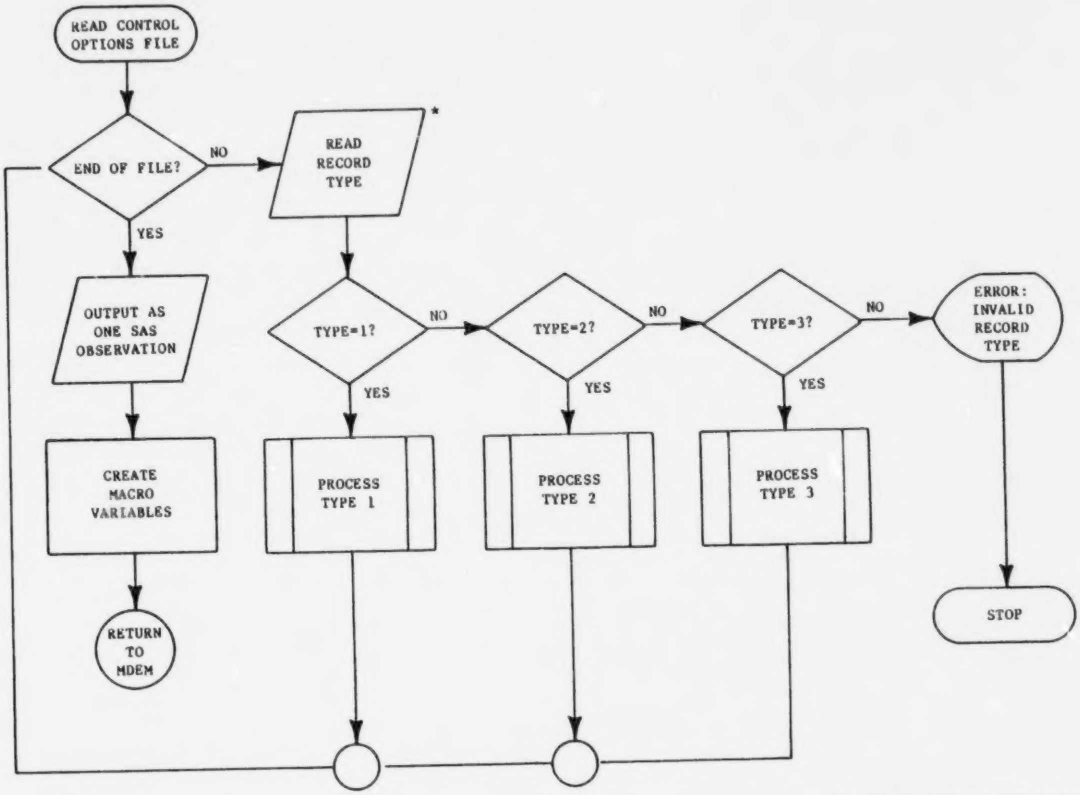
For point sources, the pollutant SAROAD codes and corresponding emissions are retained in their original format. Annual emissions are checked against Major/Minor limits specified in the COF. If any limits are exceeded, the source record is considered a major point source. If no limits are exceeded, the record is classified as a minor point source. The MDEM then checks the list of SIC/SCC combinations specified in the COF. If a match is found, the source emissions record is output to either the major or minor point source file for that SIC/SCC combination. If no match is found, the record is output to the major or minor miscellaneous file.

Area sources are not separated into major and minor categories, therefore the MDEM only checks the SIC/SCC combinations. The subroutine EISIN inputs the emissions file and divides it into SIC/SCC specific subfiles based on the control options specified. Matches are output to the corresponding SIC/SCC file while nonmatched records are added to the miscellaneous file. In addition, EISIN extracts annual emissions from SAROAD1-15 and EMISS1-15 and places emissions into 15 pollutant variables, where SAROAD1-15 are the pollutant SAROAD codes for user defined pollutants, and EMISS1-15 are the emissions corresponding to the SAROAD codes. For example, the pollutant SAROAD code corresponding to SO_2 (42401) may be found in SAROAD1 and corresponding emissions in EMISS1. MDEM will extract this information, create a variable ASO_2 and place the value of EMISS1 in ASO_2, allowing the pollutant definition and emissions to be contained in one variable. These emissions are then output to an appropriate file or subfile.

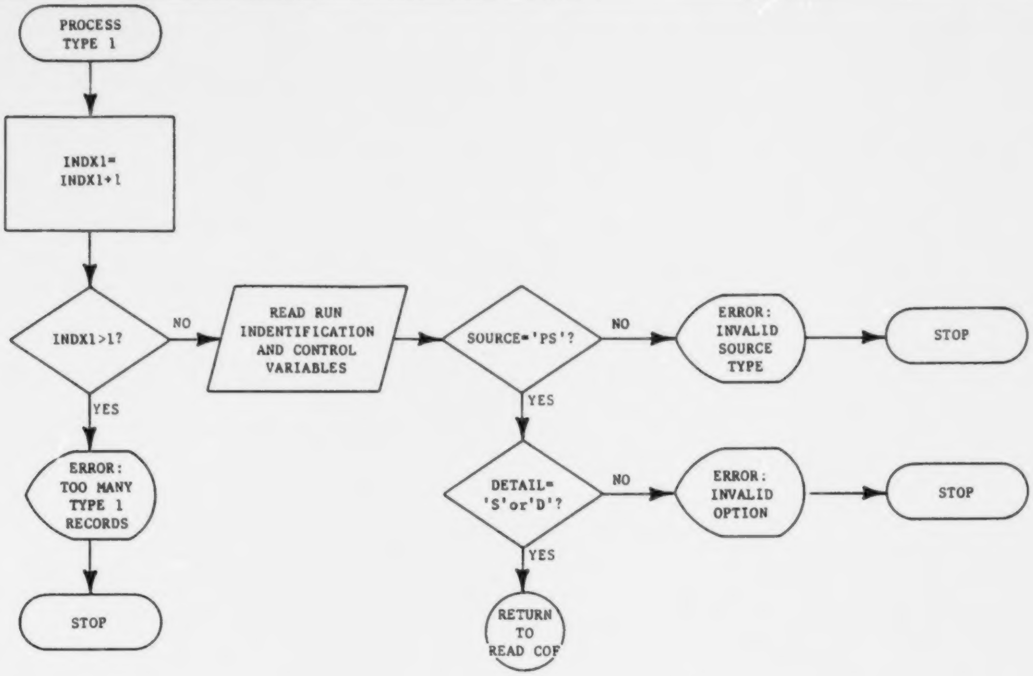
When all of the EIS Master File records have been successfully processed, the SAS print procedure is invoked by MDEM to provide the diagnostic report for point and area sources. The level of detail of the report is determined by the user in the COF. For a summary report, the control options, the counters for each file or subfile created, and each master record input type is listed along with appropriate diagnostic messages. The detailed report contains all aspects of the summary report and a listing of source identification information for each emissions record for each file or subfile. Emissions totals may also be requested for the extracted annual area source pollutants.

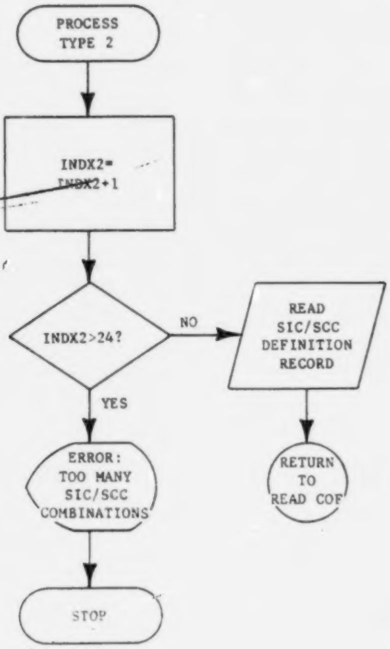
Model Data Extraction Module: Point Sources--

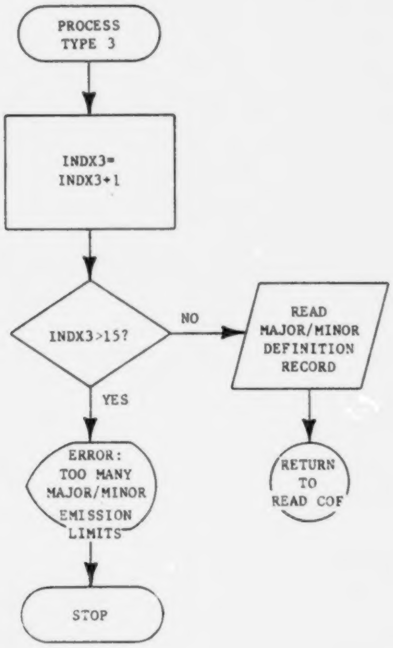

MDEM-PS
MDEM-PS
READ CONTROL OPTIONS FILE
Read run identification and control variables, and create macro variables
MACRO SETUP
&INDX2>0?
NO
YES
CREATE MACRO VARIABLES
MACRO EISIN
Read EIS Point Source File (and divide into industry-specific subfiles based on specified SIC-SCC specifications. Also divide into major-minor sources based on specified emission limits).
MACRO SORTEM
Sort Emission Files
ECHO CONTROL OPTIONS FILE
CREATE MACRO VARIABLES
MACRO DETAIL
Print reports as specified
STOP

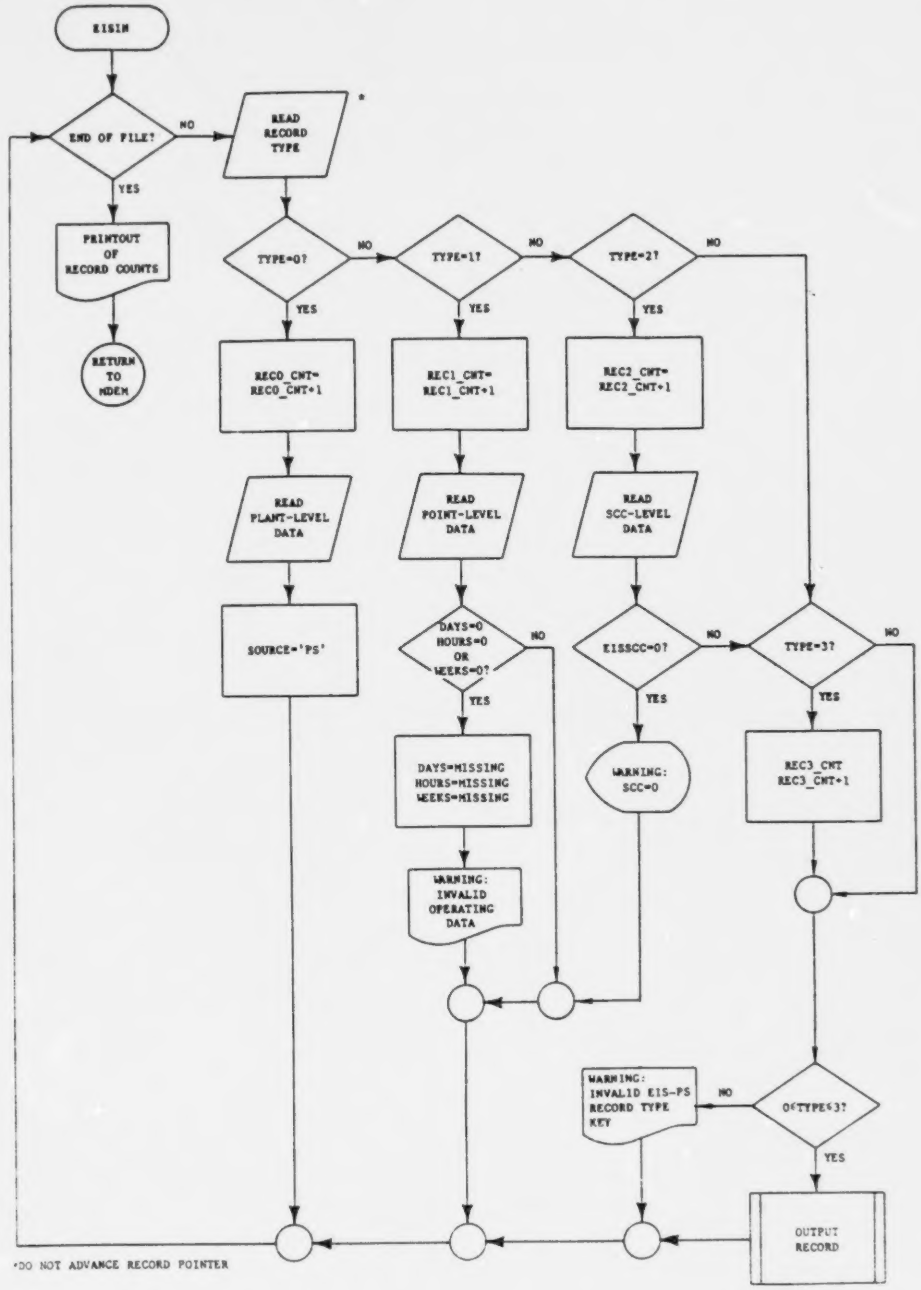


*DO NOT ADVANCE RECORD POINTER

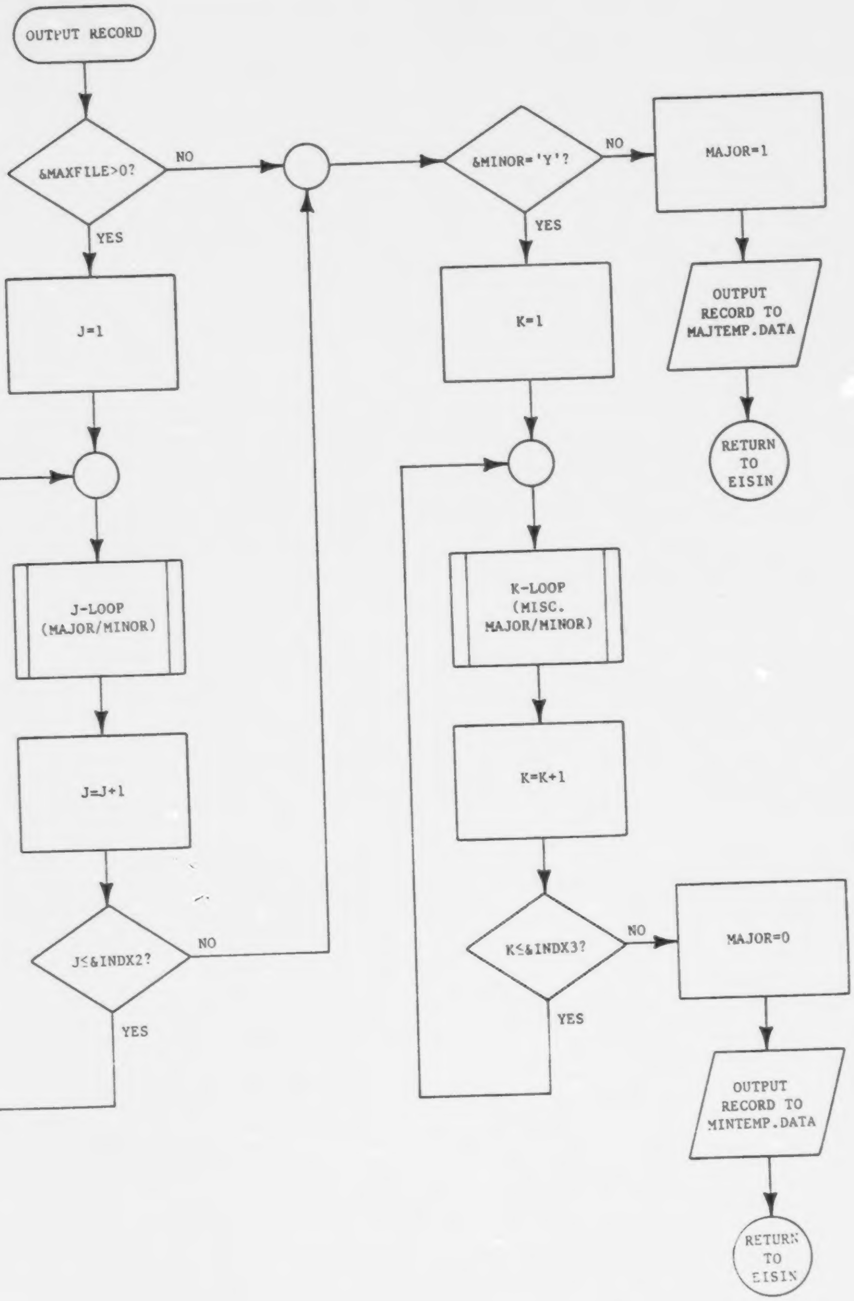

PROCESS TYPE 1
INDX1= INDX1+1
INDX1>1?
NO
YES
READ RUN INDENTIFICATION AND CONTROL VARIABLES
SOURCE='PS'?
NO
YES
ERROR: INVALID SOURCE TYPE
STOP
DETAIL= 'S'or'D'?
NO
YES
ERROR: INVALID OPTION
STOP
RETURN TO READ COF
ERROR: TOO MANY TYPE 1 RECORDS
STOP

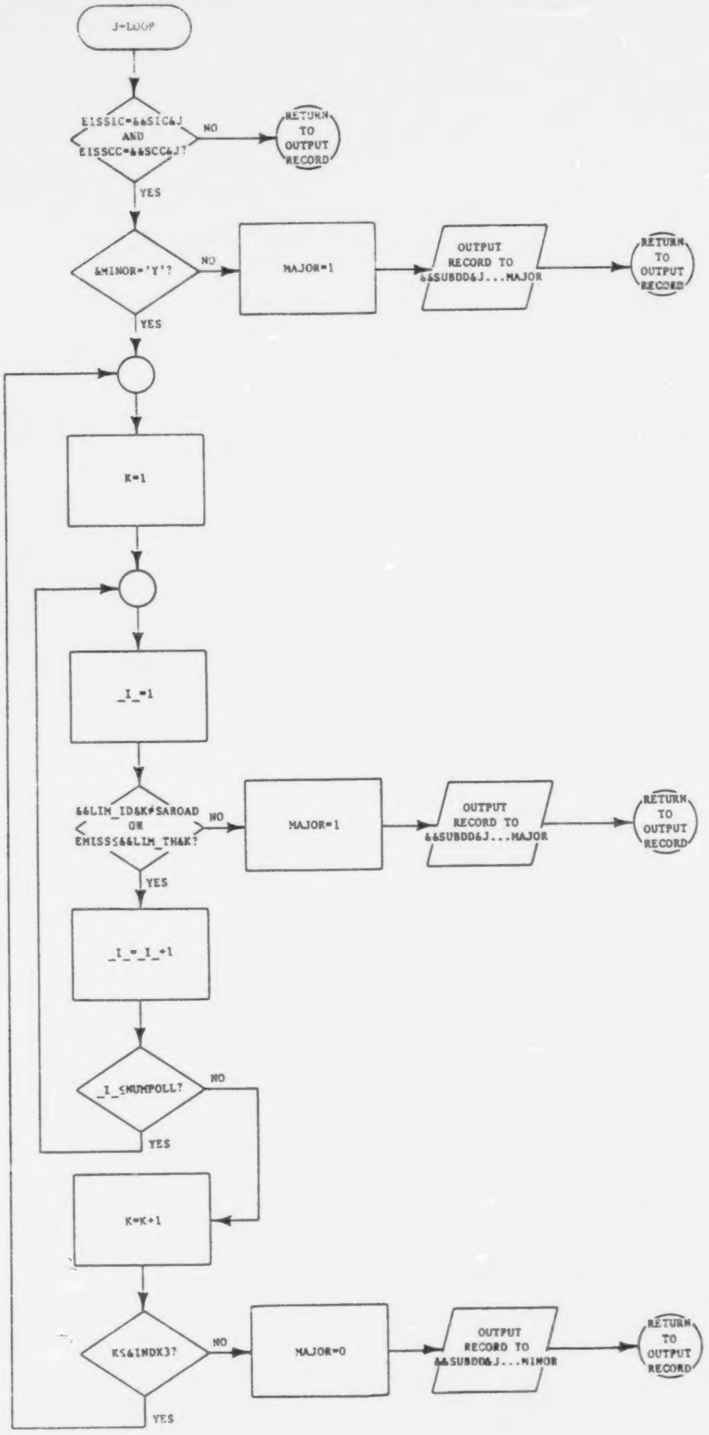

PROCESS TYPE 2
INDX2= INDX2+1
INDX2>24?
NO
YES
READ SIC/SCC DEFINITION RECORD
RETURN TO READ COF
ERROR: TOO MANY SIC/SCC COMBINATIONS
STOP

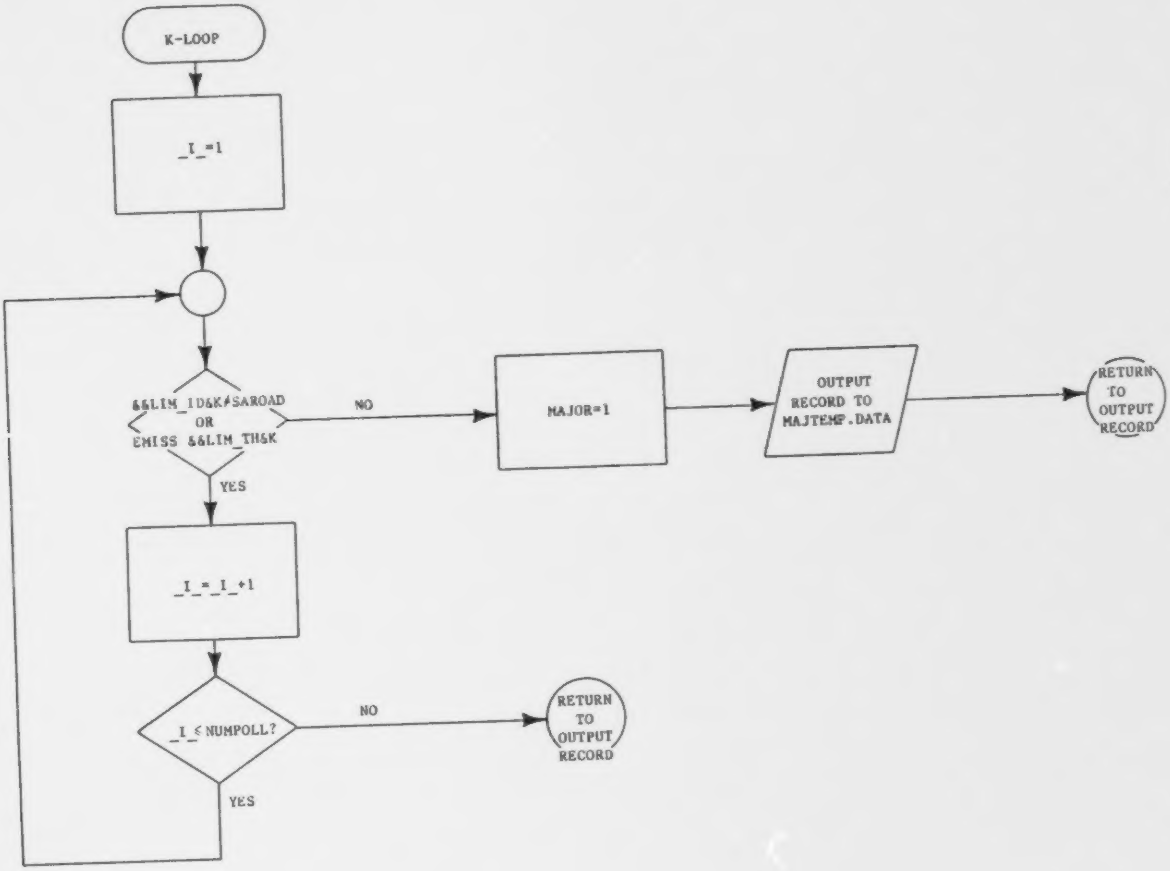

PROCESS TYPE 3
INDX3= INDX3+1
INDX3>15?
NO
YES
READ MAJOR/MINOR DEFINITION RECORD
RETURN TO READ COF
ERROR: TOO MANY MAJOR/MINOR EMISSION LIMITS
STOP

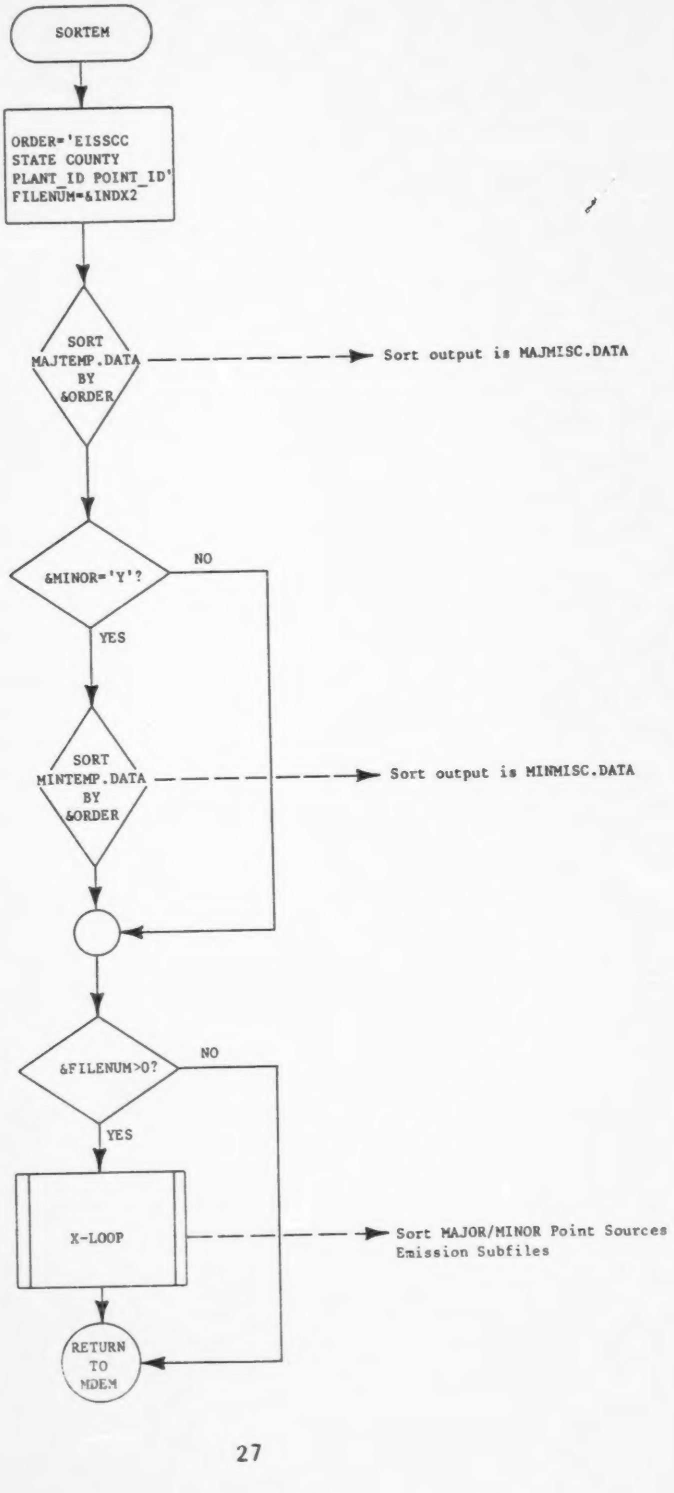


*DO NOT ADVANCE RECORD POINTER


OUTPUT RECORD
&MAXFILE>0?
NO
YES
J=1
J-LOOP (MAJOR/MINOR)
J=J+1
J≤&INDX2?
NO
YES
&MINOR='Y'?
NO
YES
MAJOR=1
OUTPUT RECORD TO MAJTEMP.DATA
RETURN TO EISIN
K=1
K-LOOP (MISC. MAJOR/MINOR)
K=K+1
K≤&INDX3?
NO
YES
MAJOR=0
OUTPUT RECORD TO MINTEMP.DATA
RETURN TO EISIN


J-LOOP
EISSIC=&&SIC&J AND EISSCC=&&SCC&J?
NO
RETURN TO OUTPUT RECORD
YES
&MINOR='Y'?
NO
MAJOR=1
OUTPUT RECORD TO &&SUBDD&J...MAJOR
RETURN TO OUTPUT RECORD
YES
K=1
_I_=1
&&LIM_ID&K≠SAROAD OR EMISS≤&&LIM_TH&K?
NO
MAJOR=1
OUTPUT RECORD TO &&SUBDD&J...MAJOR
RETURN TO OUTPUT RECORD
YES
_I_=_I_+1
_I_≤NUMPOLL?
NO
YES
K=K+1
K≤&INDX3?
NO
MAJOR=0
OUTPUT RECORD TO &&SUBDD&J...MINOR
RETURN TO OUTPUT RECORD
YES

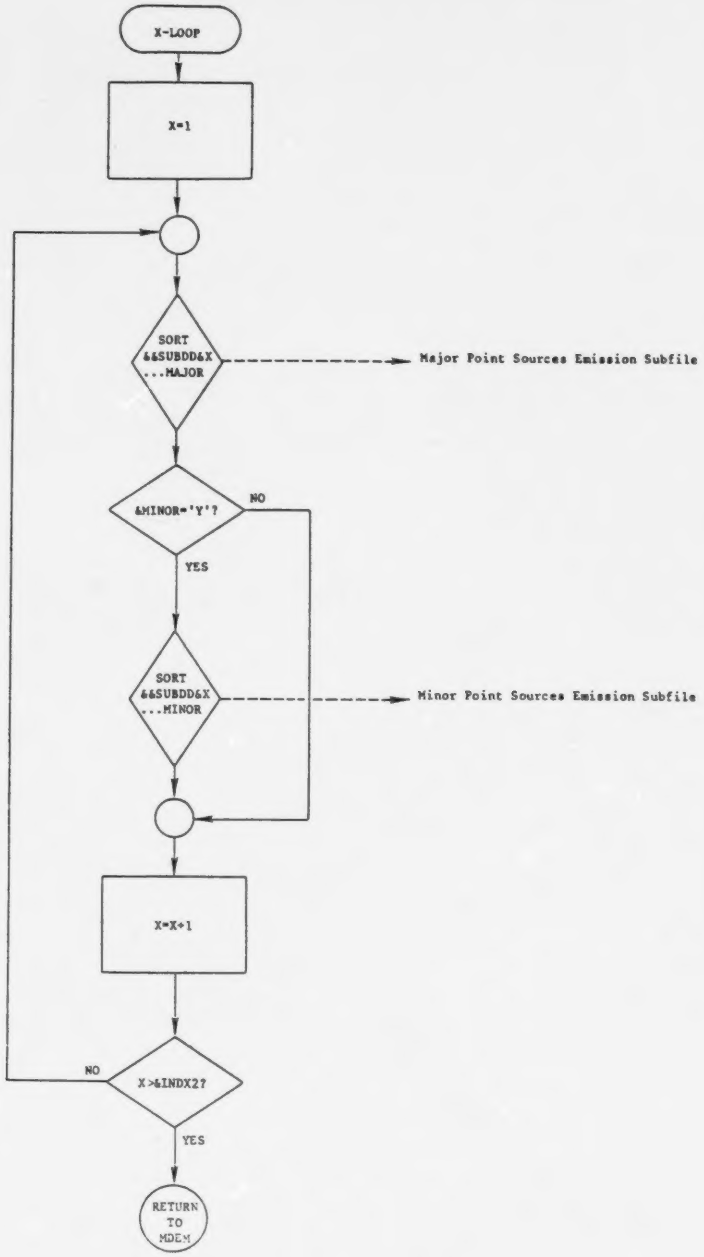

K-LOOP
_I_=1
&&LIM_ID&K≠SAROAD
OR
EMISS &&LIM_TH&K
NO
YES
MAJOR=1
OUTPUT
RECORD TO
MAJTEMP.DATA
RETURN
TO
OUTPUT
RECORD
_I_=_I_+1
_I_≤NUMPOLL?
NO
YES
RETURN
TO
OUTPUT
RECORD

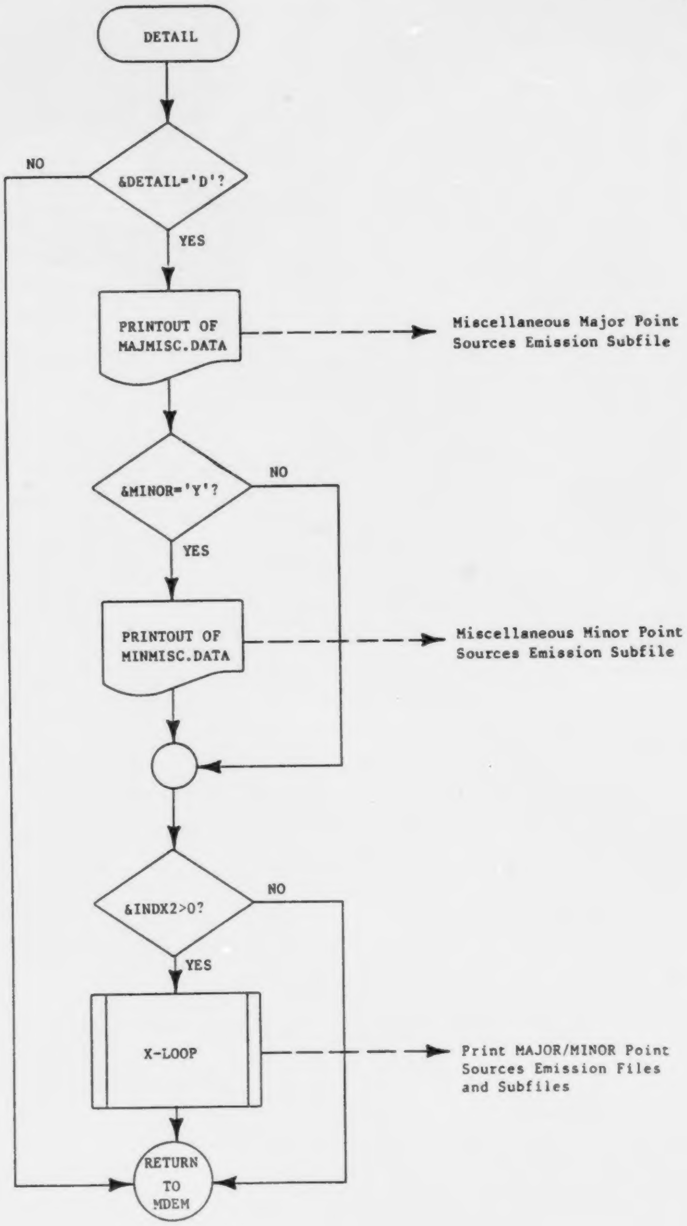


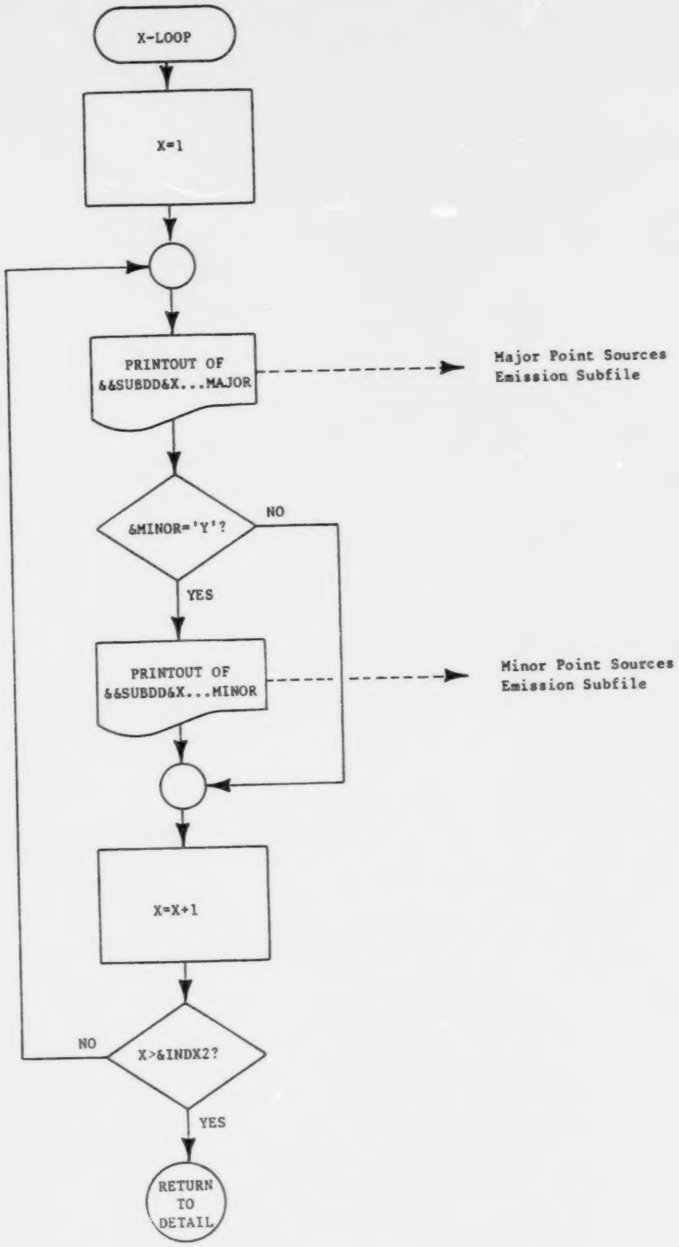
Sort output is MAJMISC.DATA

Sort output is MINMISC.DATA

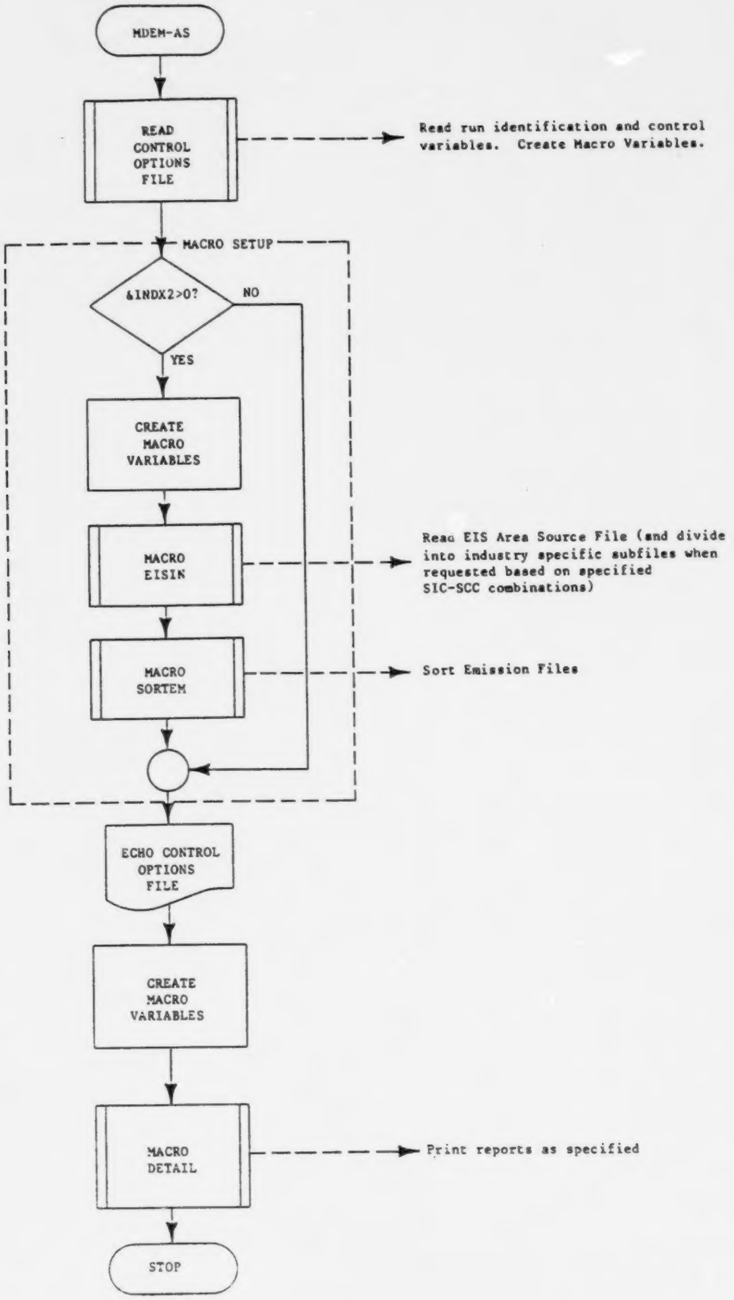
Sort MAJOR/MINOR Point Sources Emission Subfiles


X-LOOP
X=1
SORT
&&SUBDD&X
...MAJOR
Major Point Sources Emission Subfile
&MINOR='Y'?
NO
YES
SORT
&&SUBDD&X
...MINOR
Minor Point Sources Emission Subfile
X=X+1
NO
X>&INDX2?
YES
RETURN
TO
MDEM


DETAIL
&DETAIL='D'?
NO
YES
PRINTOUT OF MAJMISC.DATA
Miscellaneous Major Point Sources Emission Subfile
&MINOR='Y'?
NO
YES
PRINTOUT OF MINMISC.DATA
Miscellaneous Minor Point Sources Emission Subfile
&INDX2>0?
NO
YES
X-LOOP
Print MAJOR/MINOR Point Sources Emission Files and Subfiles
RETURN TO MDEM


X-LOOP
X=1
PRINTOUT OF &&SUBDD&X...MAJOR
Major Point Sources Emission Subfile
&MINOR='Y'?
NO
YES
PRINTOUT OF &&SUBDD&X...MINOR
Minor Point Sources Emission Subfile
X=X+1
X>&INDX2?
NO
YES
RETURN TO DETAIL

Model Data Extraction Module: Area Sources--

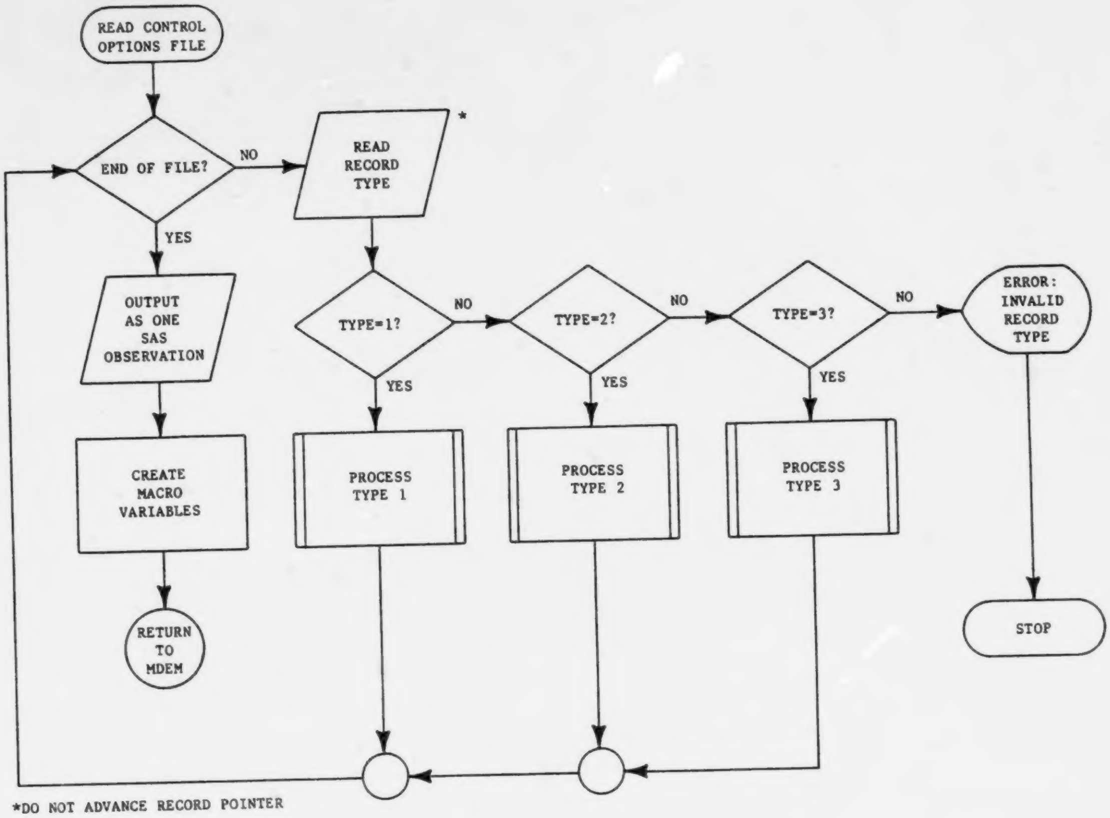


Read run identification and control variables. Create Macro Variables.

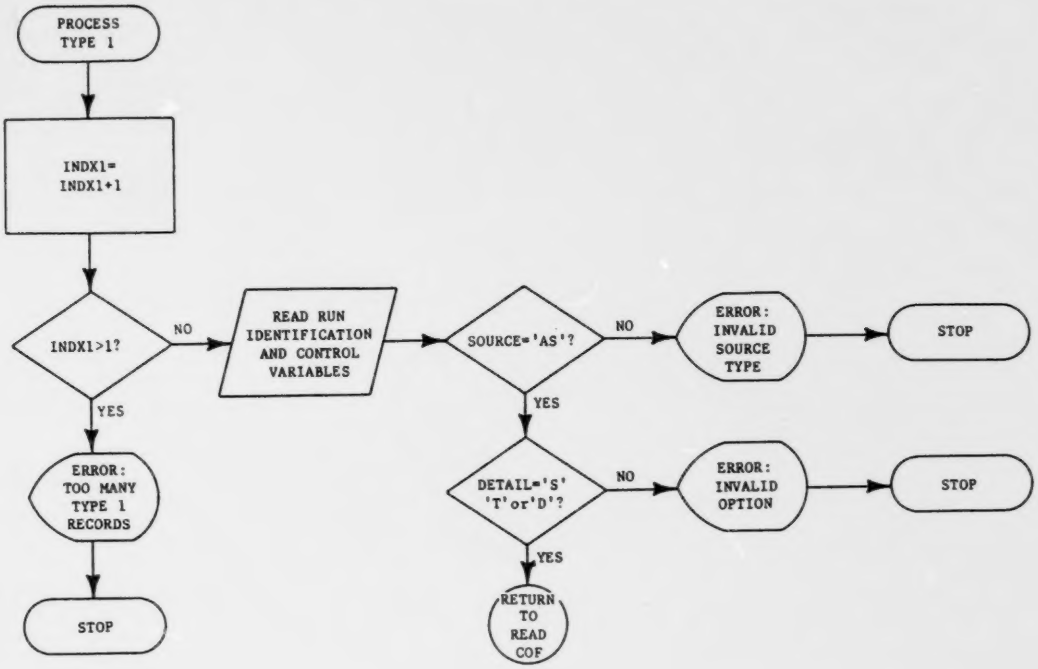
Read EIS Area Source File (and divide into industry specific subfiles when requested based on specified SIC-SCC combinations)

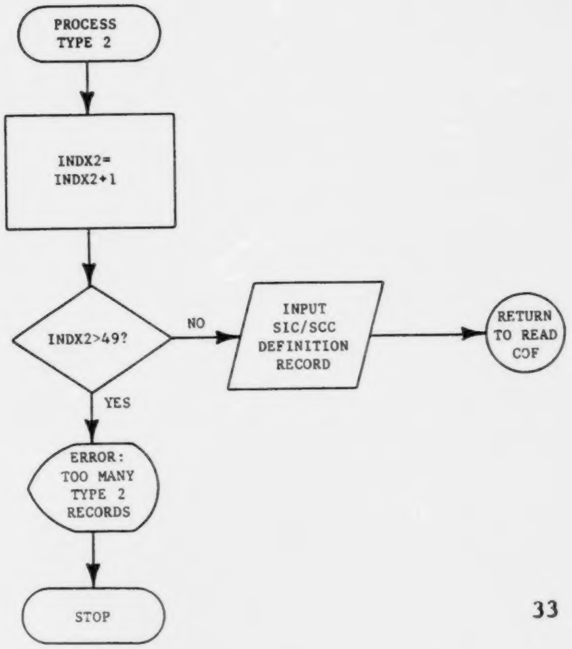
Sort Emission Files

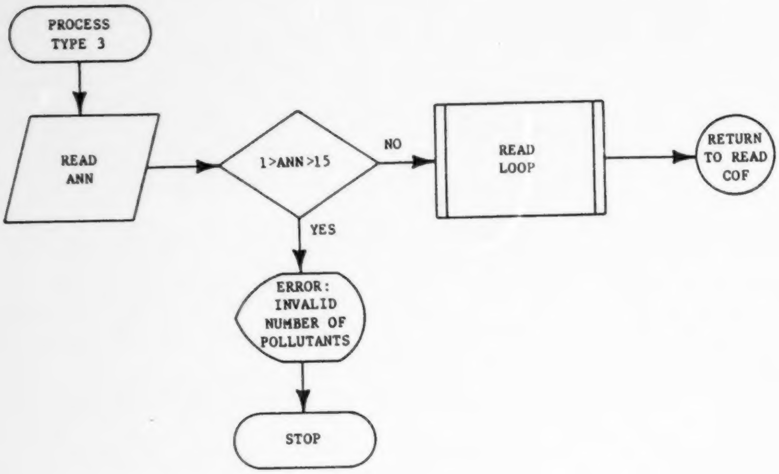
Print reports as specified

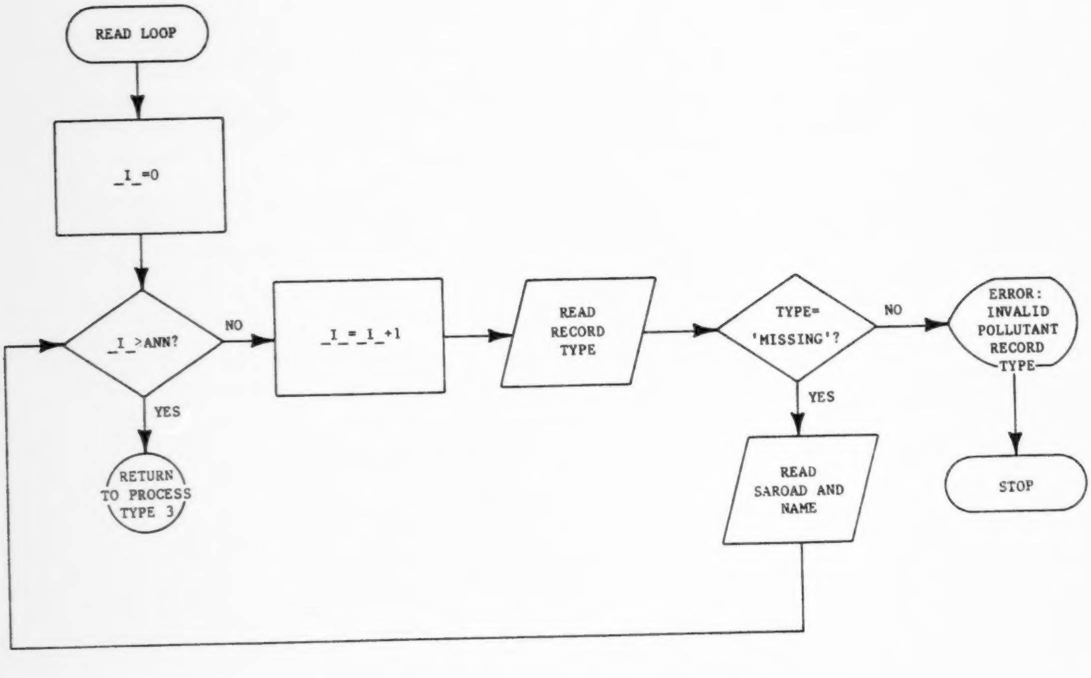


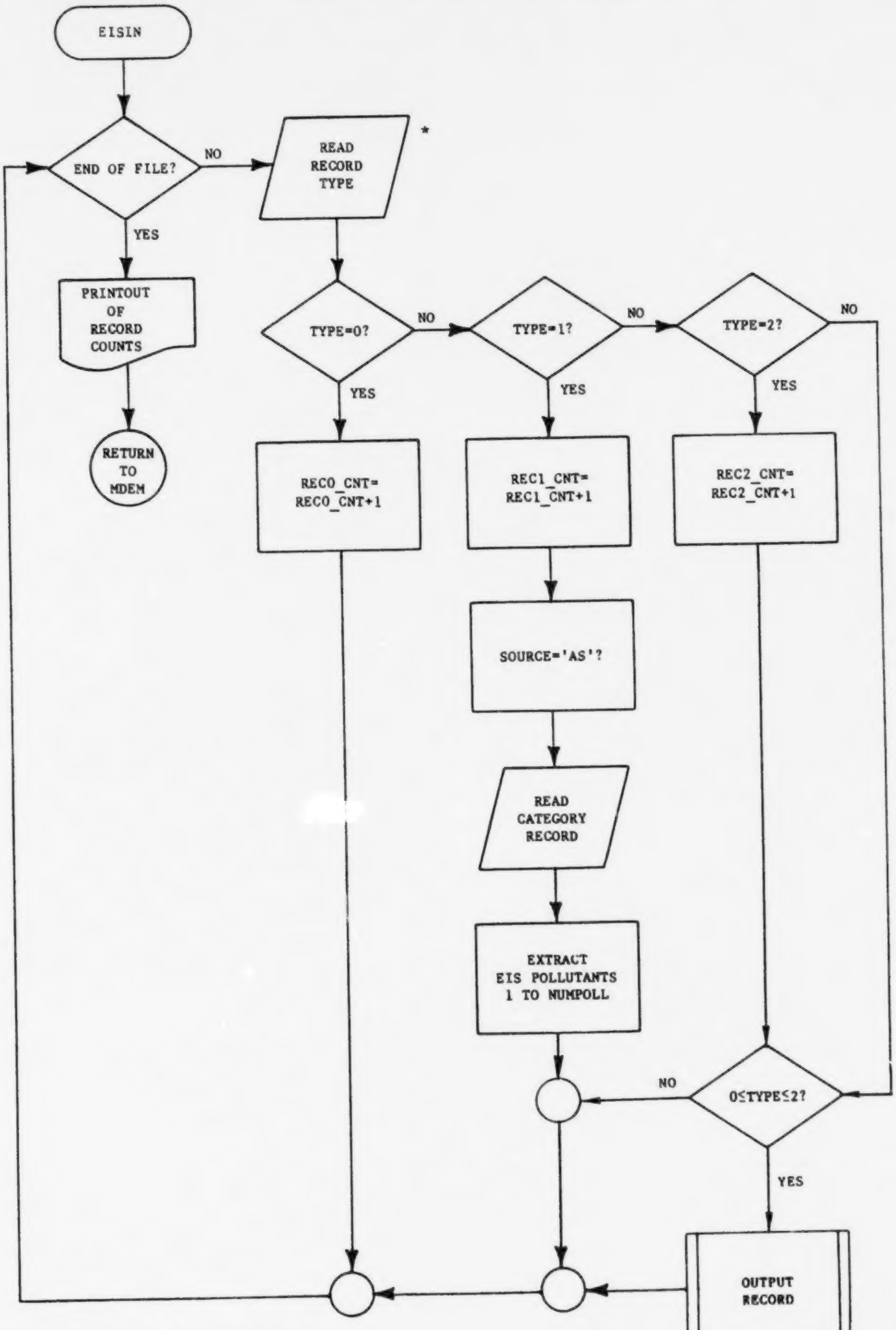
*DO NOT ADVANCE RECORD POINTER


PROCESS TYPE 1
INDX1= INDX1+1
INDX1>1?
NO
YES
READ RUN IDENTIFICATION AND CONTROL VARIABLES
SOURCE='AS'?
NO
YES
ERROR: INVALID SOURCE TYPE
STOP
DETAIL='S' 'T'or'D'?
NO
YES
ERROR: INVALID OPTION
STOP
RETURN TO READ COF
ERROR: TOO MANY TYPE 1 RECORDS
STOP

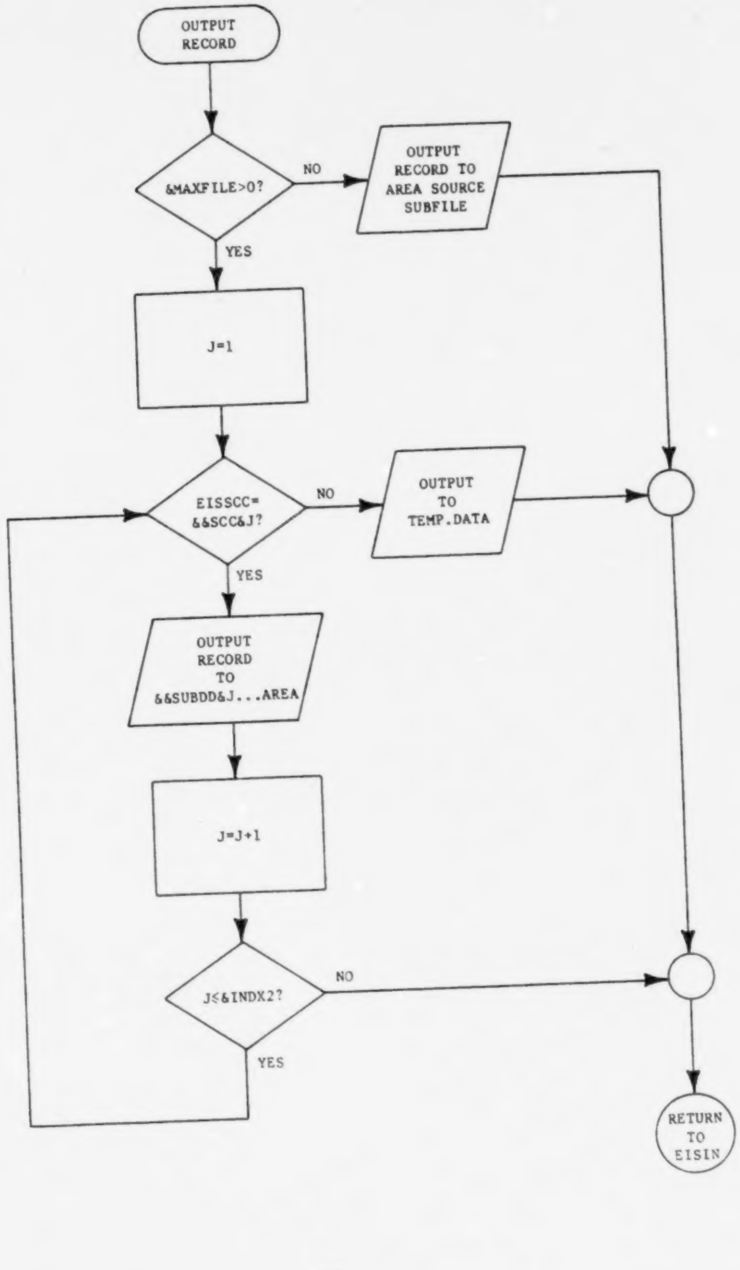

PROCESS TYPE 2
INDX2= INDX2+1
INDX2>49?
NO
INPUT SIC/SCC DEFINITION RECORD
RETURN TO READ COF
YES
ERROR: TOO MANY TYPE 2 RECORDS
STOP

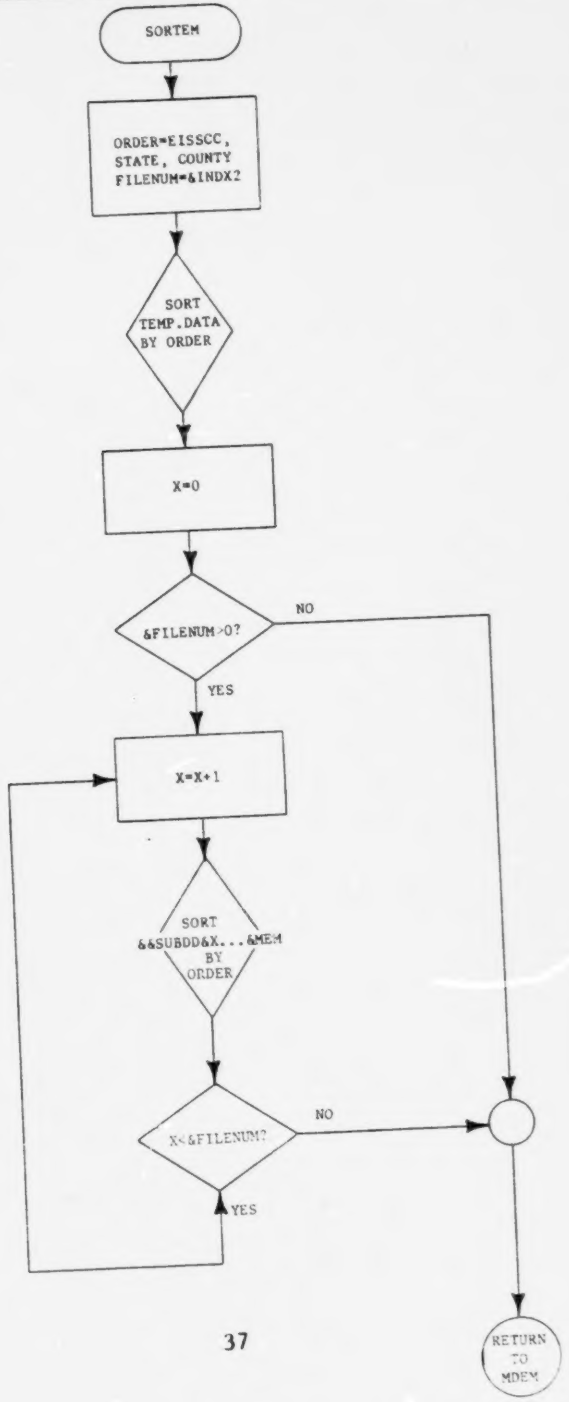

PROCESS TYPE 3
READ ANN
1>ANN>15
NO
YES
READ LOOP
RETURN TO READ COF
ERROR: INVALID NUMBER OF POLLUTANTS
STOP

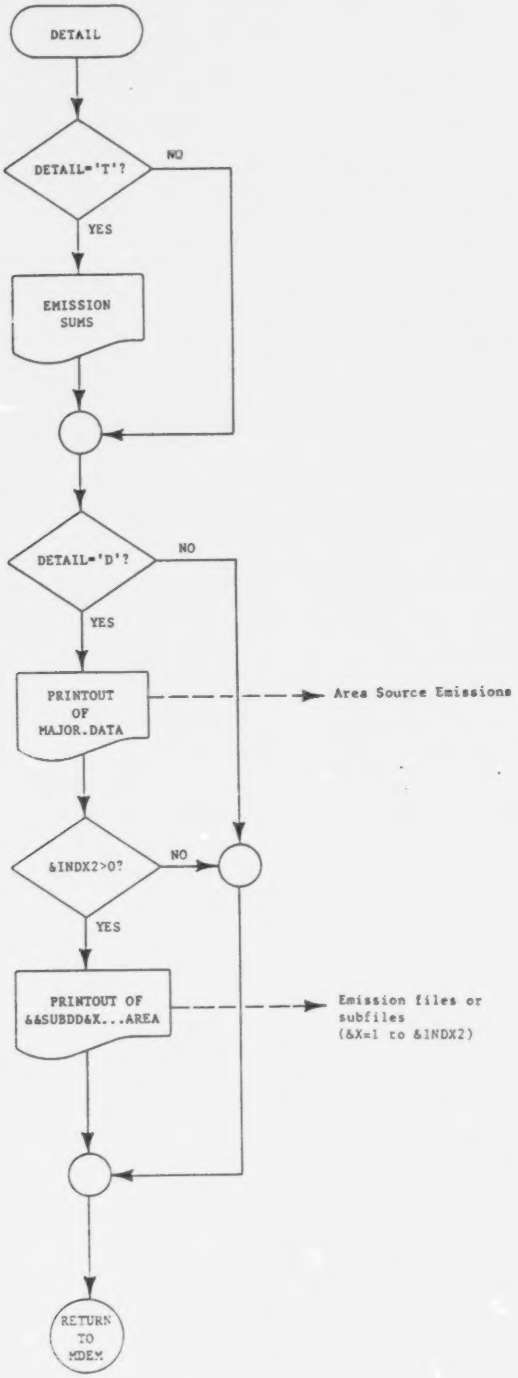

READ LOOP
_I_=0
_I_>ANN?
NO
YES
RETURN TO PROCESS TYPE 3
_I_=_I_+1
READ RECORD TYPE
TYPE= 'MISSING'?
NO
YES
ERROR: INVALID POLLUTANT RECORD TYPE
STOP
READ SAROAD AND NAME



*DO NOT ADVANCE RECORD POINTER


OUTPUT RECORD
&MAXFILE>0?
NO
OUTPUT RECORD TO AREA SOURCE SUBFILE
YES
J=1
EISSCC= &&SCC&J?
NO
OUTPUT TO TEMP.DATA
YES
OUTPUT RECORD TO &&SUBDD&J...AREA
J=J+1
J≤&INDX2?
NO
YES
RETURN TO EISIN


SORTEM
ORDER=EISSCC, STATE, COUNTY FILENUM=&INDX2
SORT TEMP.DATA BY ORDER
X=0
&FILENUM>0?
NO
YES
X=X+1
SORT &&SUBDD&X...&MEM BY ORDER
X<&FILENUM?
NO
YES
RETURN TO MDEM


DETAIL
DETAIL='T'?
NO
YES
EMISSION SUMS
DETAIL='D'?
NO
YES
PRINTOUT OF MAJOR.DATA
Area Source Emissions
&INDX2>0?
NO
YES
PRINTOUT OF &&SUBDD&X...AREA
Emission files or subfiles (&X=1 to &INDX2)
RETURN TO MDEM

TEMPORAL ALLOCATION MODULE

Reduced point and area source emissions output from any of the FREDS modules are temporally resolved in the Temporal Allocation Module (TAM). Input to the TAM includes the Temporal Allocation Factor File (TAFF) containing temporal allocation factors which present, for each SCC, a series of fractional multipliers representing the seasonal, daily, and hourly percentages of annual emissions. The series of fractional multipliers in the TAFF are merged with each emissions record based on SCC, State, and County.

The TAFF provides allocation factors for up to 12 "typical" days (a weekday, Saturday, and Sunday in each season). Each allocation factor record has an SCC code which serves as the primary reference in matching emission records to the appropriate set of allocation factors. Each temporal allocation factor record provides seasonal, daily, and 24 hourly allocation factors. TAM matches emissions from each SCC record with the appropriate set of allocation factors by starting with the most specific definition level (county) and deferring, in steps, to the least specific (global, e.g., all occurrences of a given SCC). If no pattern is supplied for an SCC encountered in the TAFF, the TAM generates a default pattern based on the operating rate data found in the point source emissions record. If point source operating rate data are missing or incomplete, a uniform distribution is assigned, and an appropriate warning message is written to the diagnostic report. If area source temporal factors are missing, a uniform pattern is assigned.

The ASTAF macro, invoked in the main program, merges area source files with corresponding temporal allocation fractions and offsets local time to Greenwich Mean Time (GMT). The merged file is output in EBCDIC characters and sorted by Column and Row or SCC, State, and County using the IBM utility SYNCSORT. For nongridded emissions, the merged file may be sorted by EISSCC, State, and County. The variable EMRES, specified in the control file directs the TAM to output the appropriate variables to be sorted by SYNCSORT. The MTPREP control file directs MTPREP.FORT and MTPREP.SAS to the correct level of resolution for the remainder of TAM processing. The sorted file is processed by MTPREP.FORT (a FORTRAN subroutine which multiplies emissions by their temporal factors), and MTPREP.SAS (a SAS subroutine which converts EBCDIC characters to SAS format), producing hourly gridded or county-level emissions totals. In this routine, local time is adjusted to GMT on the basis of information previously extracted from the Time Zone File: State and County codes, a time zone flag and a daylight savings flag. Temporally resolved area source emissions are output for further processing in FREDS.

For point sources, the macro EXECUTE controls TAM processing, reads the Time Zone File into a SAS data set to be merged with the emissions file and invokes the PSTAF macro. The PSTAF subroutine merges point source emission records with their corresponding temporal allocation factors. For unmatched records, operating data are used to determine temporal fractions. When operating data are not available, a uniform distribution is assigned. Point source emission records containing temporal allocation factors are output for further FREDS processing.

Also output is a diagnostic report including summary statistics documenting the actions performed by the TAM. An optional hard copy listing of temporal allocation factors is also available for both point and area sources.

Flow Chart and Description

The TAM temporally resolves emissions data created by any of the FREDS modules. Detailed descriptions for point and area sources are given in the accompanying flow charts and are described below. An individual "set" of flow charts is presented each for point and area sources. The first diagram of each set represents the overall module flow. Processes depicted by double vertical lines indicate the presence of several subprocesses, and hence a second level of more detailed diagrams are presented for these. For example, the first double-lined process is "READ CONTROL OPTIONS FILE". Starting on the next page, the reader will find a second-level chart with the same name. On completion of the second level of subprocesses, the user returns to the first level. The user would then continue on the first level until the next double-lined process is encountered - "READ TIME ZONE FILE". Again, the reader refers to a second level diagram. This continues until the reader has encountered all processes depicted on the main module flow chart. The area source flow chart reflects the flexibility of TAM in accepting gridded or county-level emissions.

TAM first reads and validates the temporal Control Options File (COF) and puts these options into a SAS data set. The COF for area source processing contains values for the temporal scenario desired, the level of detail of the diagnostic report, the SAS member name of the emissions file, a run identification header, level of resolution of the emissions file, and a pollutant variable list. For point sources, the Run Identification record contains the level of detail of the diagnostic report, the SAS member name of the emissions file, the number of days in the Temporal Allocation Factor File, and the run identification header. Also within the main body, TAM creates macro variables from control options input for point source and area source processing. For point sources, TAFDAY identifies the number of temporal scenarios for the PSTAF macro and SASMEM is the SAS member name of the input emissions file (e.g., NAPAP52). The area source macro variables created in the main program (TAFDAY, SASMEM, LIST, DAYLITE, and EMRES) direct TAM to the appropriate temporal scenario, SAS member name of the input emissions file, pollutant variable list, daylight savings flag, and level of resolution of the emissions file (e.g., gridded or nongridded).

Point source execution of the TAM is controlled by the SAS macro routine EXECUTE. Within EXECUTE, the Time Zone File is read in and the merge subroutine, PSTAF, is invoked. For area sources, the ASTAF macro is invoked within the body of the main program. Both routines (PSTAF and ASTAF) read the TAFF into a SAS data set and sort by EISSCC, State, and County.

Processing of the temporal data differs for point and area source emissions files. For area sources, the subroutine ASTAF merges the TAFF with the emissions file by EISSCC and State. All matches at this level are output. The remaining records are merged by SCC and output. Nonmatches are then assigned a default pattern of temporally uniform emissions and output. The three output files are finally interleaved to reflect the original order.

In the ASTAF subroutine, variables previously read in from the Time Zone File are used to offset local time to GMT. ASTAF then outputs emissions and temporal allocation factors, converts from SAS format to EBCDIC characters and sorts by Column and Row or SCC, State and County using the IBM utility SYNCSORT. The level of resolution of the area source emissions (Column, Row or SCC, State, County) to be sorted is specified in the control variable EMRES. To determine the appropriate sort fields, the user should refer to "User Supplied JCL" for TAM in the Control Statements section. The sorted data set is passed on to the subroutine MTPREP.FORT which multiplies emissions by the appropriate temporal allocation factors and outputs EBCDIC hourly emissions totals. MTPREP.SAS then converts the hourly emissions from EBCDIC to SAS and outputs the area source file or subfile for further FREDS processing. The number of pollutants and level of resolution of the emissions file for MTPREP.FORT and MTPREP.SAS are specified by the user in the MTPREP control file.

For point sources, the processing macro, EXECUTE, reads and sorts the Time Zone File by State and County. Pertinent variables (e.g., EISSCC, State, County, Plant ID, Point ID) from the emissions file are subsettled into a temporary data set and merged with the Time Zone File. The merged file is resorted by EISSCC, State, County, Plant ID and Point ID and merged with the point source emissions file by the above sort variables. This file is output to a temporary data set for temporal processing in the PSTAF macro, also invoked within EXECUTE.

The macro subroutine PSTAF merges temporal factors with the emissions file. Where no patterns are supplied in the Temporal Allocation Factor File, temporal factors are generated using the operating rate data contained in the emissions file. If the operating rates are missing, a uniform, standard temporal pattern is generated by TAM.

When the point source temporal allocation process is complete, all the observations in the emissions file contain the proper temporal allocation factors and an emissions file is output containing unresolved emissions, time zone data, and corresponding temporal allocation factors.

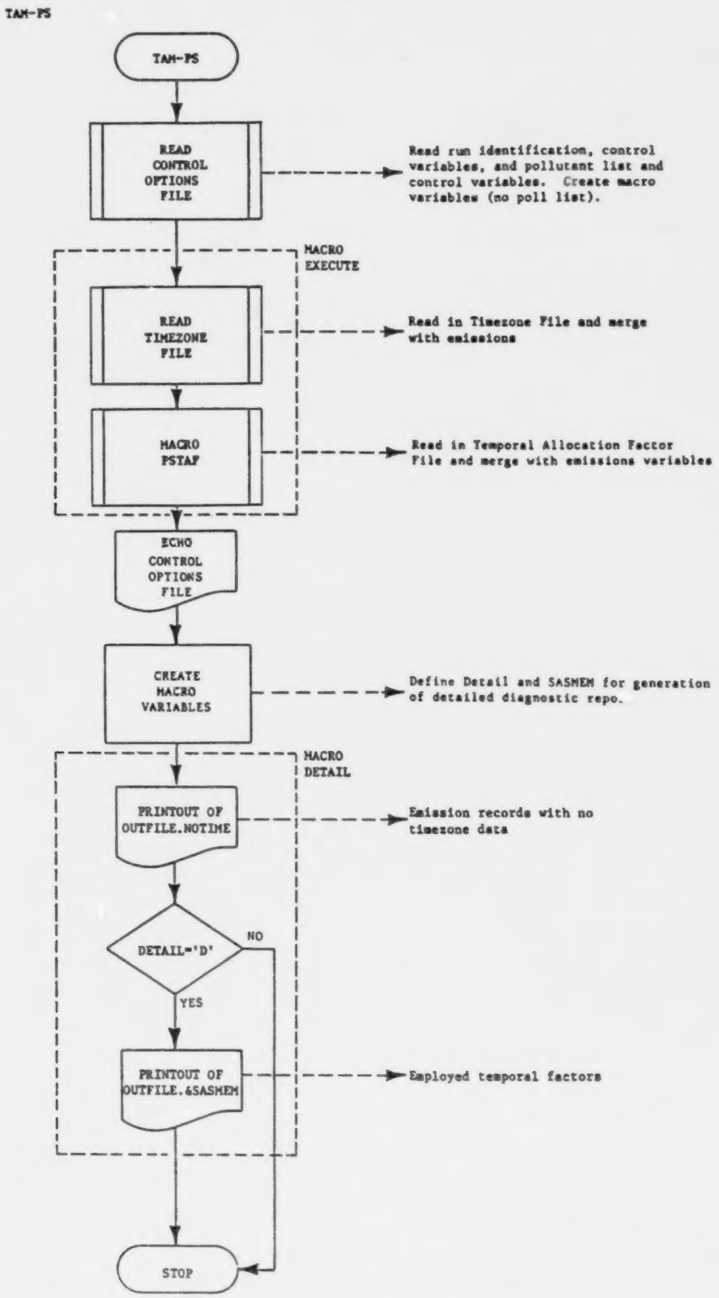
A diagnostic report is generated which contains, at the summary level, processing information, run identification information, and accounting data. Emission records without time zone data are also printed. If the optional detailed report is requested, the SAS print procedure will be invoked to provide a listing of temporal allocation factors.

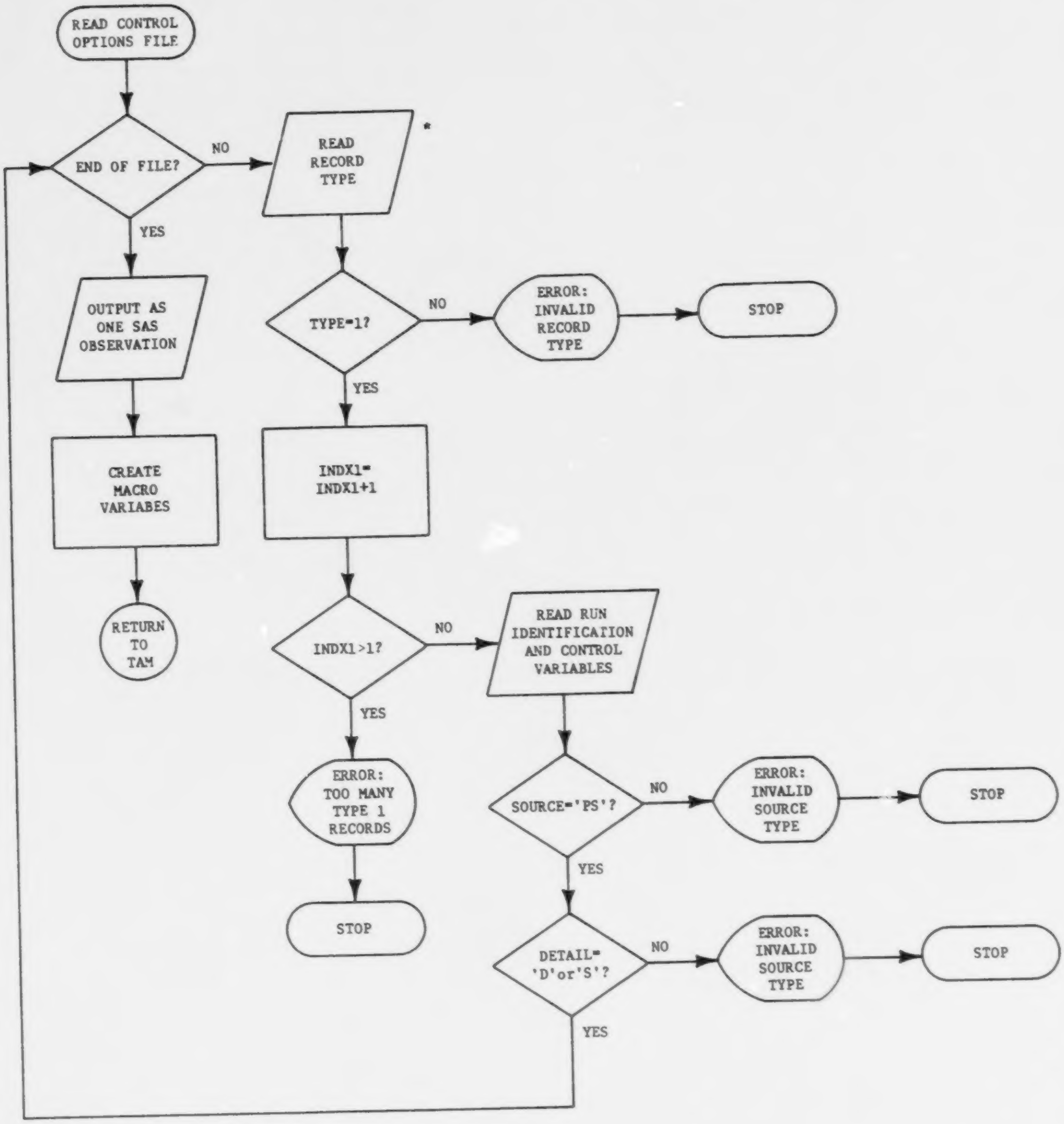
Peripheral Software

Before input to FREDS, the mathematical validity of the Temporal Allocation Factor File is ensured by running the Temporal Allocation Factor Preprocessor (TAFP). The TAFP performs five checks:

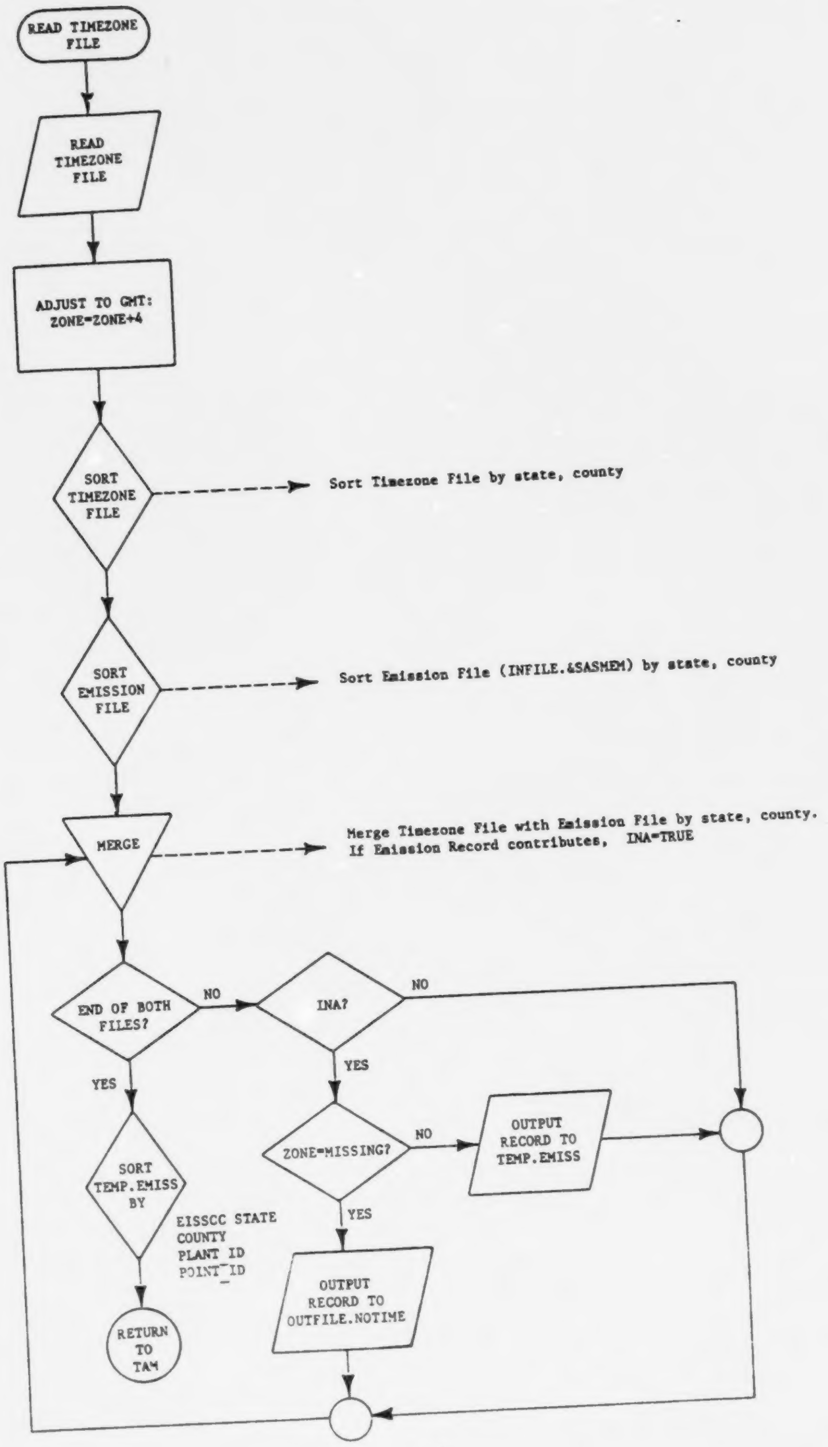
1. For a given EISSCC, State, County TAF group, scenarios 1 through 12 are present and in sequence;
2. The sum of hourly factors over a day is 1.0 +/- 0.025;
3. The weighted sum of daily factors (13*(sat+sun) + 65*wkd) over a day is 1.0 +/- 0.03;
4. The sum of seasonal factors over a year is 1.0 +/- 0.01;
5. Seasonal factors do not vary over the 3 days within one season.

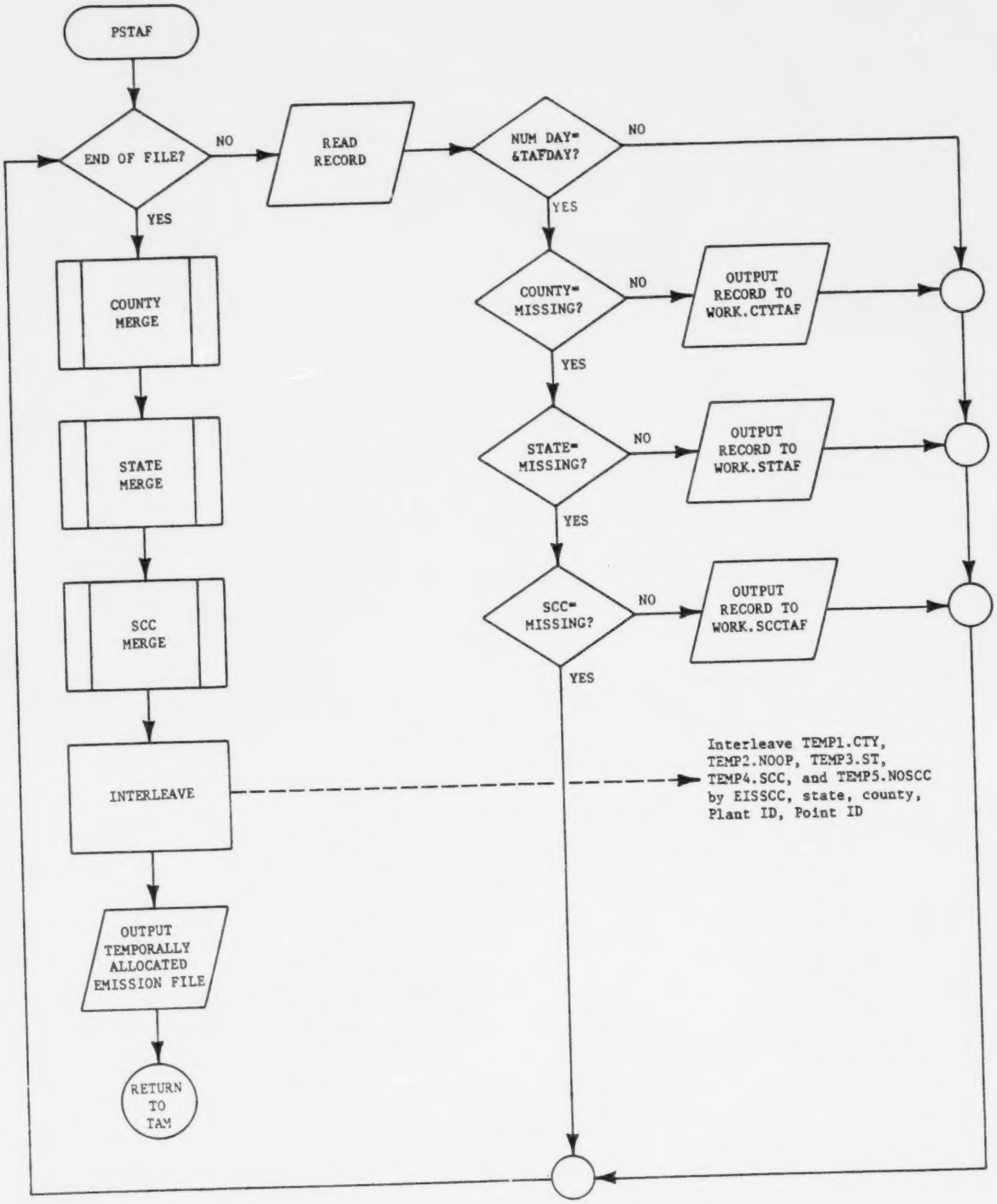
Temporal Allocation Module: Point Sources--

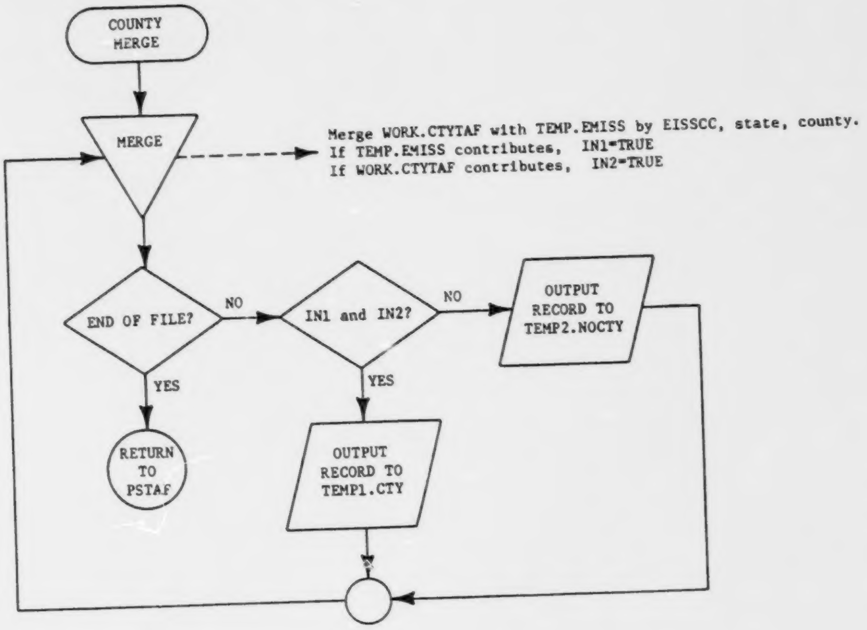

TAM-PS
TAM-PS
READ CONTROL OPTIONS FILE
Read run identification, control variables, and pollutant list and control variables. Create macro variables (no poll list).
MACRO EXECUTE
READ TIMEZONE FILE
Read in Timezone File and merge with emissions
MACRO PSTAF
Read in Temporal Allocation Factor File and merge with emissions variables
ECHO CONTROL OPTIONS FILE
CREATE MACRO VARIABLES
Define Detail and SASMEM for generation of detailed diagnostic repo.
MACRO DETAIL
PRINTOUT OF OUTFILE.NOTIME
Emission records with no timezone data
DETAIL='D'
NO
YES
PRINTOUT OF OUTFILE.&SASMEM
Employed temporal factors
STOP

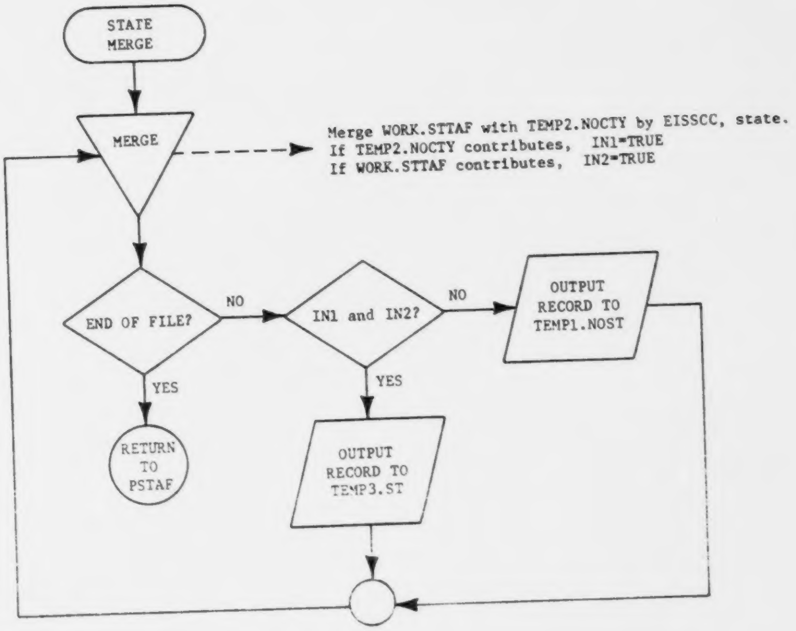

READ CONTROL OPTIONS FILE
END OF FILE?
NO
YES
READ RECORD TYPE
*
OUTPUT AS ONE SAS OBSERVATION
TYPE=1?
NO
ERROR: INVALID RECORD TYPE
STOP
YES
CREATE MACRO VARIABES
INDX1=INDX1+1
RETURN TO TAM
INDX1>1?
NO
READ RUN IDENTIFICATION AND CONTROL VARIABLES
YES
ERROR: TOO MANY TYPE 1 RECORDS
SOURCE='PS'?
NO
ERROR: INVALID SOURCE TYPE
STOP
YES
STOP
DETAIL='D'or'S'?
NO
ERROR: INVALID SOURCE TYPE
STOP
YES

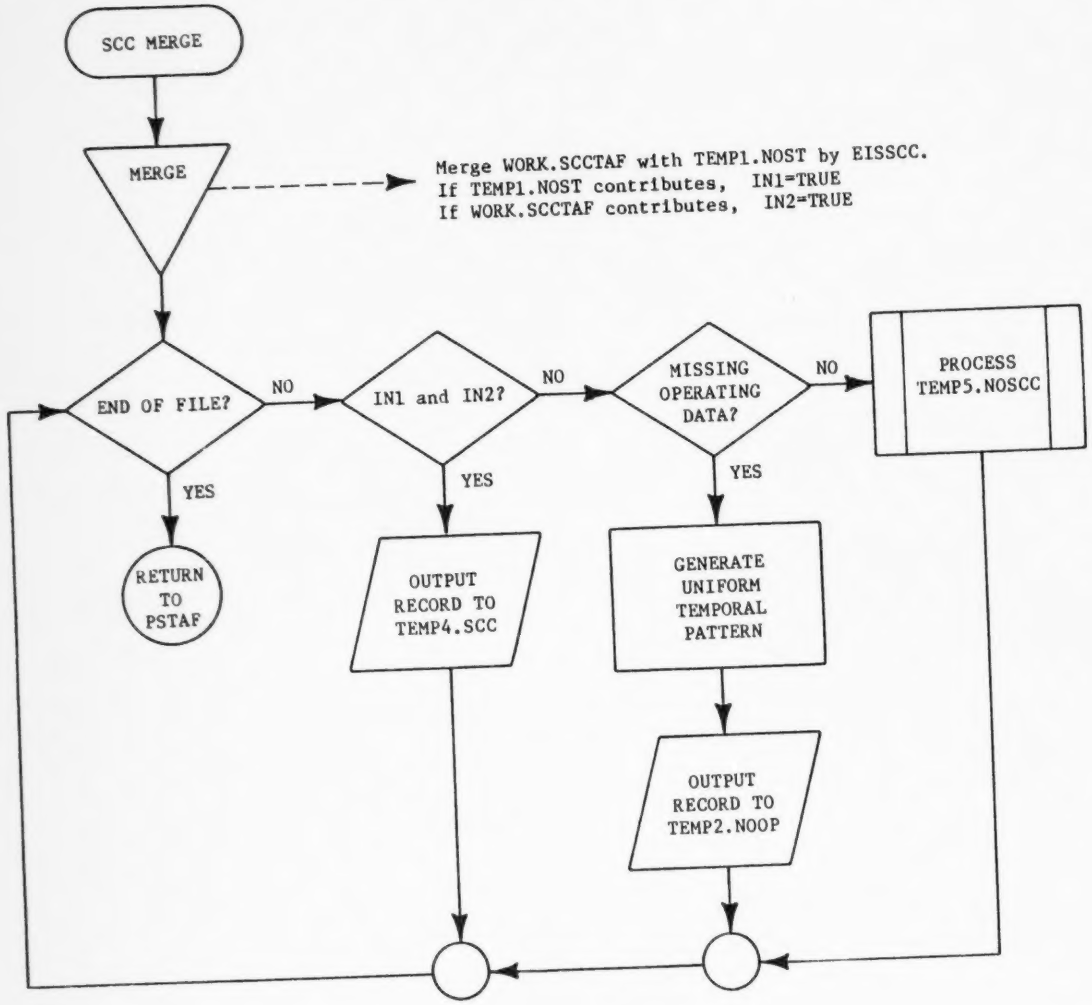
*DO NOT ADVANCE RECORD POINTER

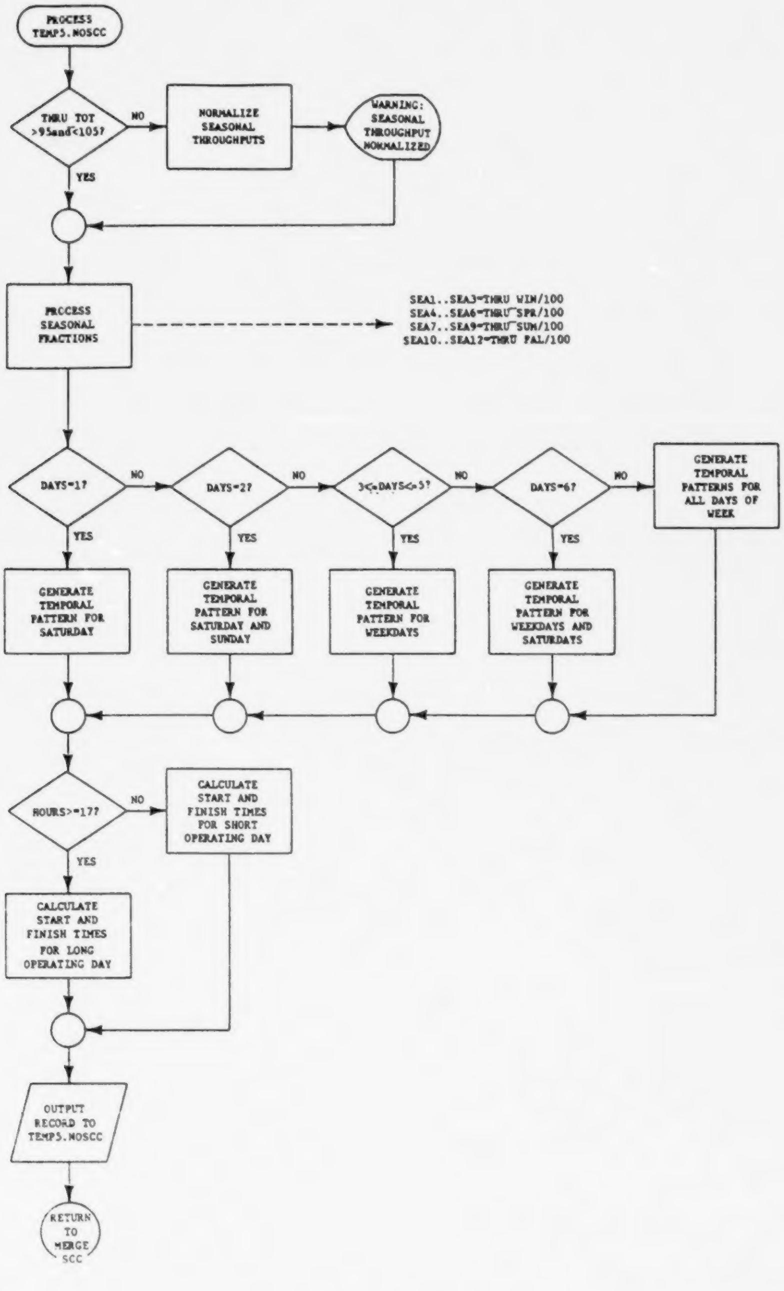

READ TIMEZONE FILE
READ TIMEZONE FILE
ADJUST TO GMT: ZONE=ZONE+4
SORT TIMEZONE FILE
Sort Timezone File by state, county
SORT EMISSION FILE
Sort Emission File (INFILE.&SASMEM) by state, county
MERGE
Merge Timezone File with Emission File by state, county.
If Emission Record contributes, INA=TRUE
END OF BOTH FILES?
NO
INA?
NO
YES
YES
SORT TEMP.EMISS BY
EISSCC STATE
COUNTY
PLANT_ID
POINT_ID
ZONE=MISSING?
NO
OUTPUT RECORD TO TEMP.EMISS
YES
OUTPUT RECORD TO OUTFILE.NOTIME
RETURN TO TAM


PSTAF
END OF FILE?
NO
YES
READ RECORD
NUM DAY= &TAFDAY?
NO
YES
COUNTY= MISSING?
NO
OUTPUT RECORD TO WORK.CTYTAF
YES
STATE= MISSING?
NO
OUTPUT RECORD TO WORK.STTAF
YES
SCC= MISSING?
NO
OUTPUT RECORD TO WORK.SCCTAF
YES
COUNTY MERGE
STATE MERGE
SCC MERGE
INTERLEAVE
Interleave TEMP1.CTY, TEMP2.NOOP, TEMP3.ST, TEMP4.SCC, and TEMP5.NOSCC by EISSCC, state, county, Plant ID, Point ID
OUTPUT TEMPORALLY ALLOCATED EMISSION FILE
RETURN TO TAM

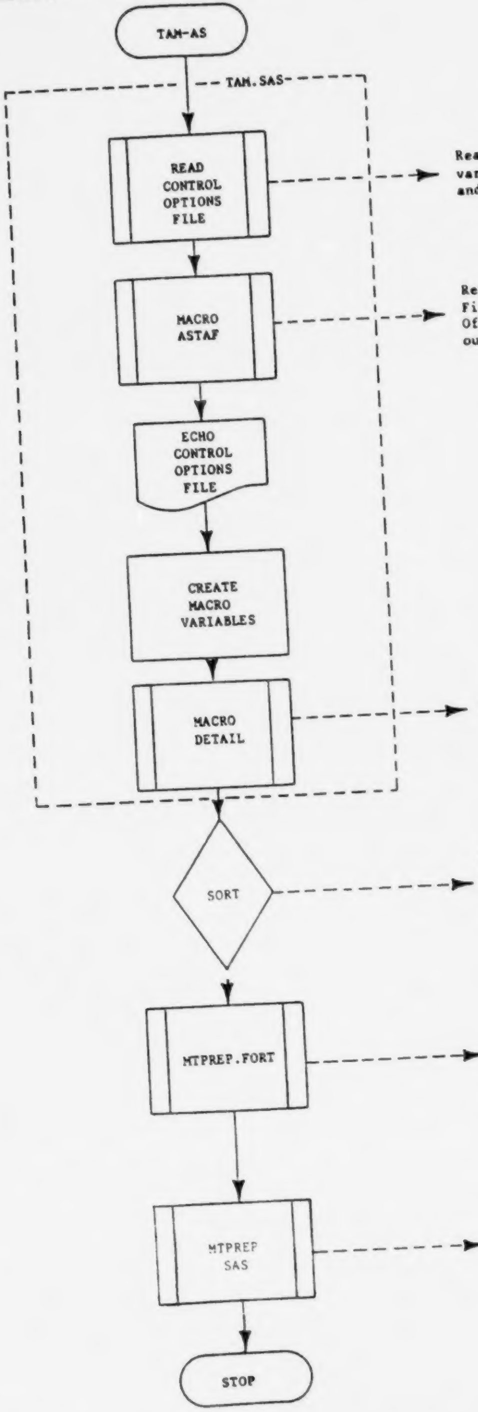

COUNTY MERGE
MERGE
Merge WORK.CTYTAF with TEMP.EMISS by EISSCC, state, county.
If TEMP.EMISS contributes, IN1=TRUE
If WORK.CTYTAF contributes, IN2=TRUE
END OF FILE?
NO
YES
RETURN TO PSTAF
IN1 and IN2?
NO
YES
OUTPUT RECORD TO TEMP2.NOCTY
OUTPUT RECORD TO TEMP1.CTY


STATE MERGE
MERGE
Merge WORK.STTAF with TEMP2.NOCTY by EISSCC, state.
If TEMP2.NOCTY contributes, IN1=TRUE
If WORK.STTAF contributes, IN2=TRUE
END OF FILE?
NO
YES
RETURN TO PSTAF
IN1 and IN2?
NO
YES
OUTPUT RECORD TO TEMP1.NOST
OUTPUT RECORD TO TEMP3.ST


SCC MERGE
MERGE
Merge WORK.SCCTAF with TEMP1.NOST by EISSCC.
If TEMP1.NOST contributes, IN1=TRUE
If WORK.SCCTAF contributes, IN2=TRUE
END OF FILE?
NO
YES
RETURN TO PSTAF
IN1 and IN2?
NO
YES
OUTPUT RECORD TO TEMP4.SCC
MISSING OPERATING DATA?
NO
YES
GENERATE UNIFORM TEMPORAL PATTERN
OUTPUT RECORD TO TEMP2.NOOP
PROCESS TEMP5.NOSCC


PROCESS TEMP5.NOSCC
THRU TOT >95and<105?
NO
NORMALIZE SEASONAL THROUGHPUTS
WARNING: SEASONAL THROUGHPUT NORMALIZED
YES
PROCESS SEASONAL FRACTIONS
SEA1..SEA3=THRU WIN/100
SEA4..SEA6=THRU SPR/100
SEA7..SEA9=THRU SUM/100
SEA10..SEA12=THRU FAL/100
DAYS=1?
NO
DAYS=2?
NO
3<=DAYS<=5?
NO
DAYS=6?
NO
GENERATE TEMPORAL PATTERNS FOR ALL DAYS OF WEEK
YES
GENERATE TEMPORAL PATTERN FOR SATURDAY
YES
GENERATE TEMPORAL PATTERN FOR SATURDAY AND SUNDAY
YES
GENERATE TEMPORAL PATTERN FOR WEEKDAYS
YES
GENERATE TEMPORAL PATTERN FOR WEEKDAYS AND SATURDAYS
HOURS>=17?
NO
CALCULATE START AND FINISH TIMES FOR SHORT OPERATING DAY
YES
CALCULATE START AND FINISH TIMES FOR LONG OPERATING DAY
OUTPUT RECORD TO TEMP5.NOSCC
RETURN TO MERGE SCC

Temporal Allocation Module: Area Sources--



Read run identification, control variables and pollutant list, and create macro variables

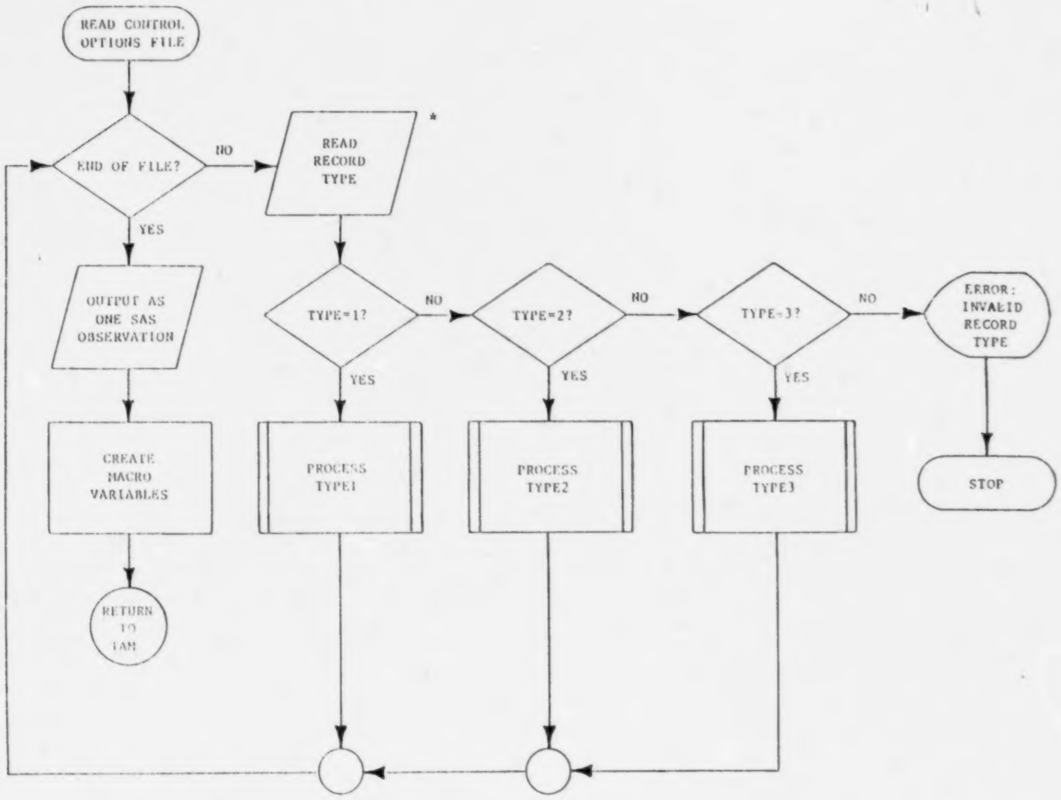
Read in Temporal Allocation Factor File and merge with Emissions File. Offset hourly data to GMT and output in EBCDIC.

Print report if specified

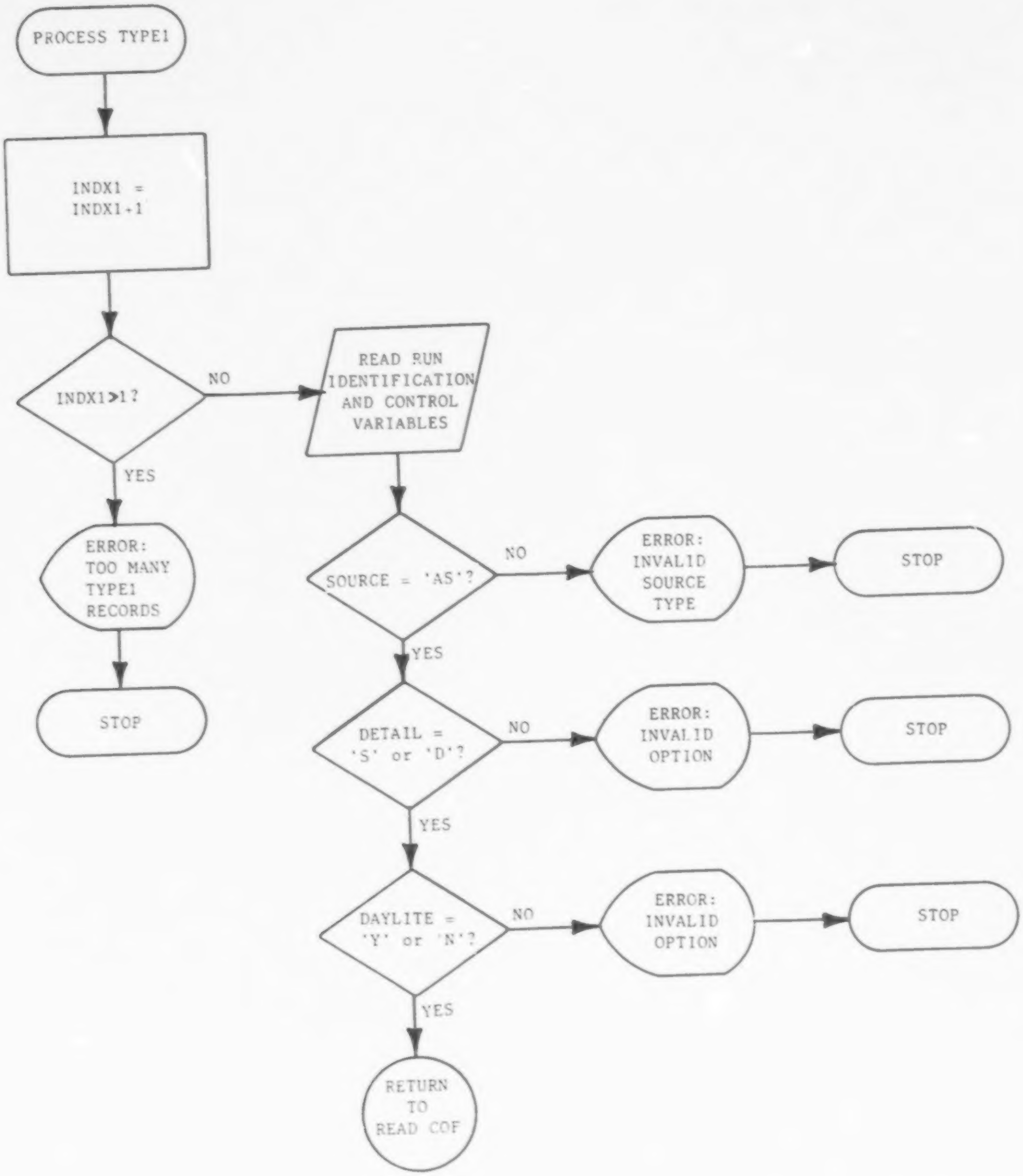
Sort (IBM SYNCSORT) EBCDIC Emissions File by (column, row) or by (SCC, State, County), depending on emissions resolution specified in COF

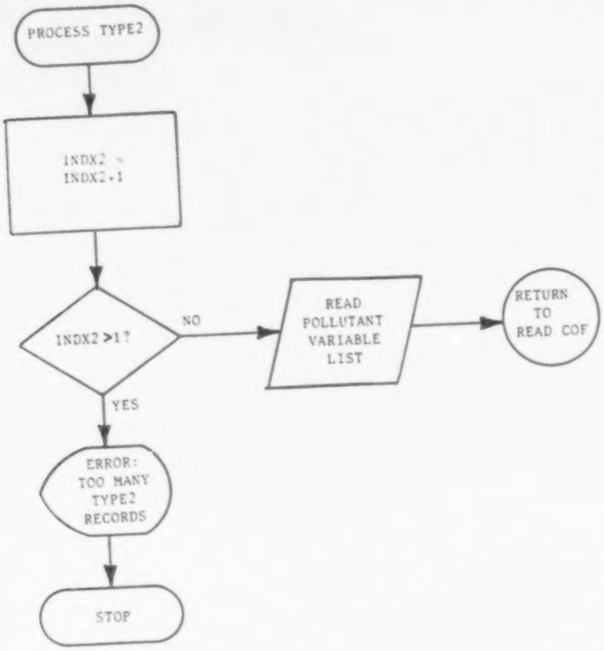
Multiply emissions by Temporal Allocation Factors

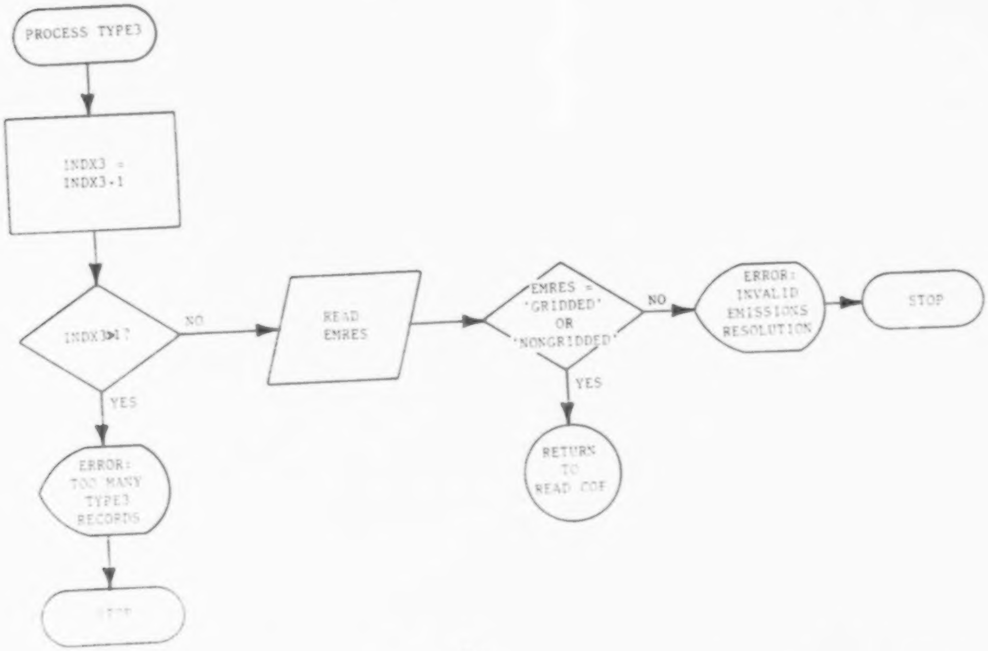
Read temporally resolved EBCDIC emissions into SAS format

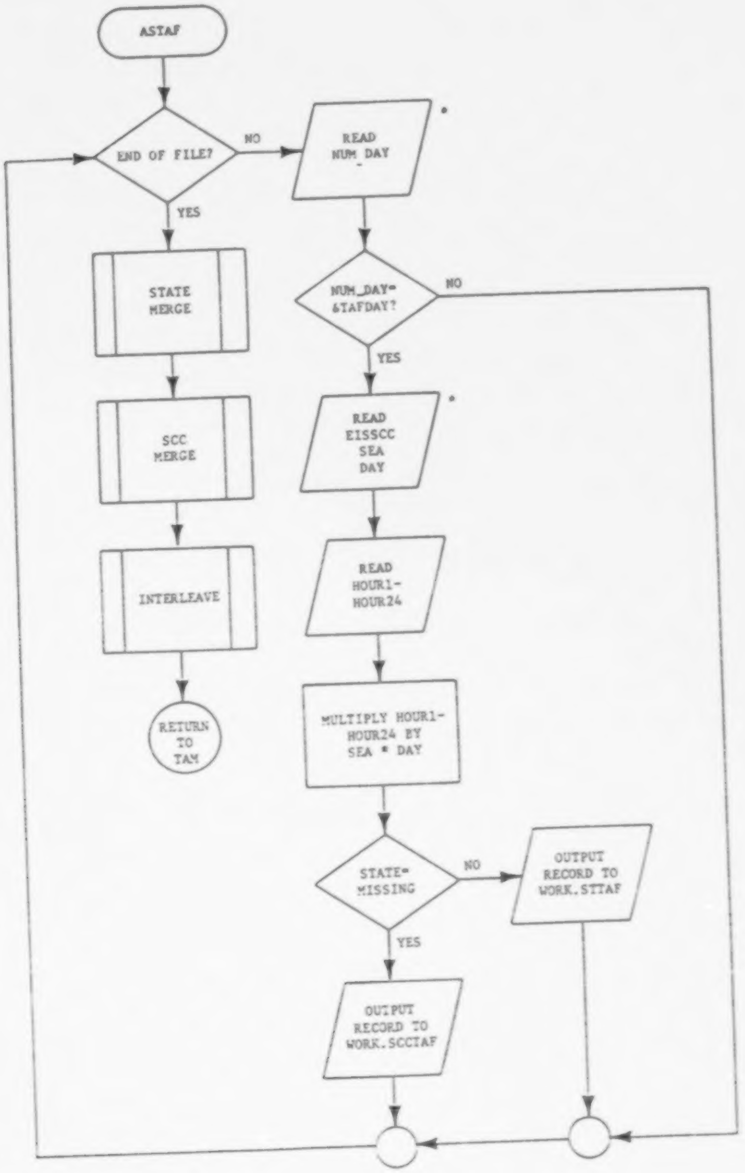


*DO NOT ADVANCE RECORD POINTER

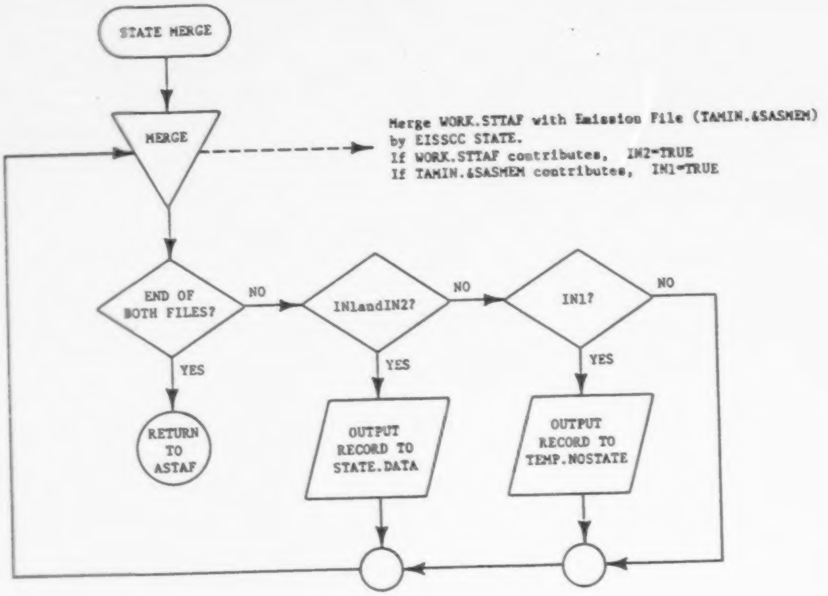

PROCESS TYPE1
INDX1 = INDX1+1
INDX1>1?
NO
YES
ERROR: TOO MANY TYPE1 RECORDS
STOP
READ RUN IDENTIFICATION AND CONTROL VARIABLES
SOURCE = 'AS'?
NO
ERROR: INVALID SOURCE TYPE
STOP
YES
DETAIL = 'S' or 'D'?
NO
ERROR: INVALID OPTION
STOP
YES
DAYLITE = 'Y' or 'N'?
NO
ERROR: INVALID OPTION
STOP
YES
RETURN TO READ COF


PROCESS TYPE2
INDX2 = INDX2+1
INDX2 >1?
NO
READ POLLUTANT VARIABLE LIST
RETURN TO READ COF
YES
ERROR: TOO MANY TYPE2 RECORDS
STOP

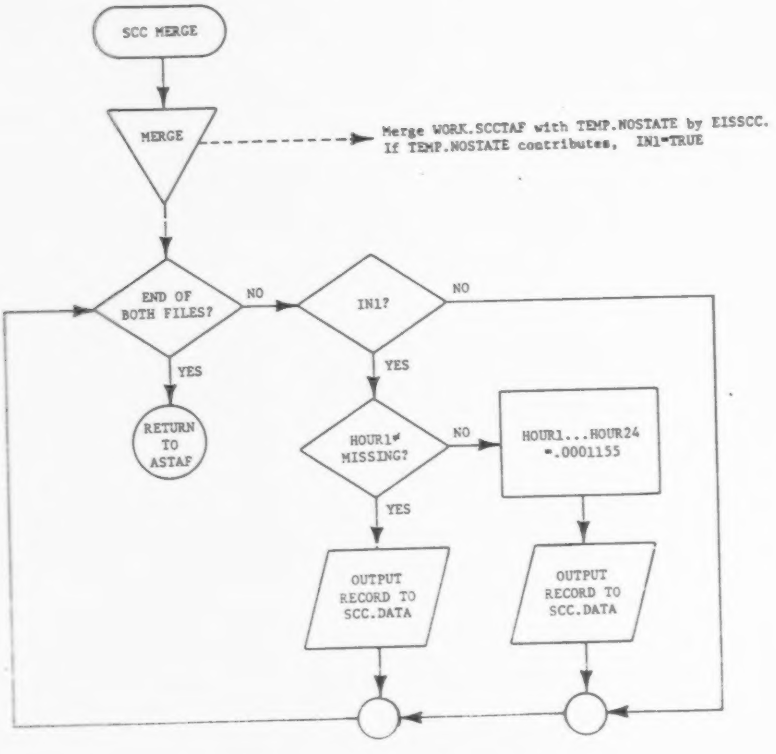

PROCESS TYPE3
INDX3 = INDX3+1
INDX3>1?
NO
READ EMRES
EMRES = 'GRIDDED' OR 'NONGRIDDED'
NO
ERROR: INVALID EMISSIONS RESOLUTION
STOP
YES
RETURN TO READ COF
YES
ERROR: TOO MANY TYPE3 RECORDS
STOP



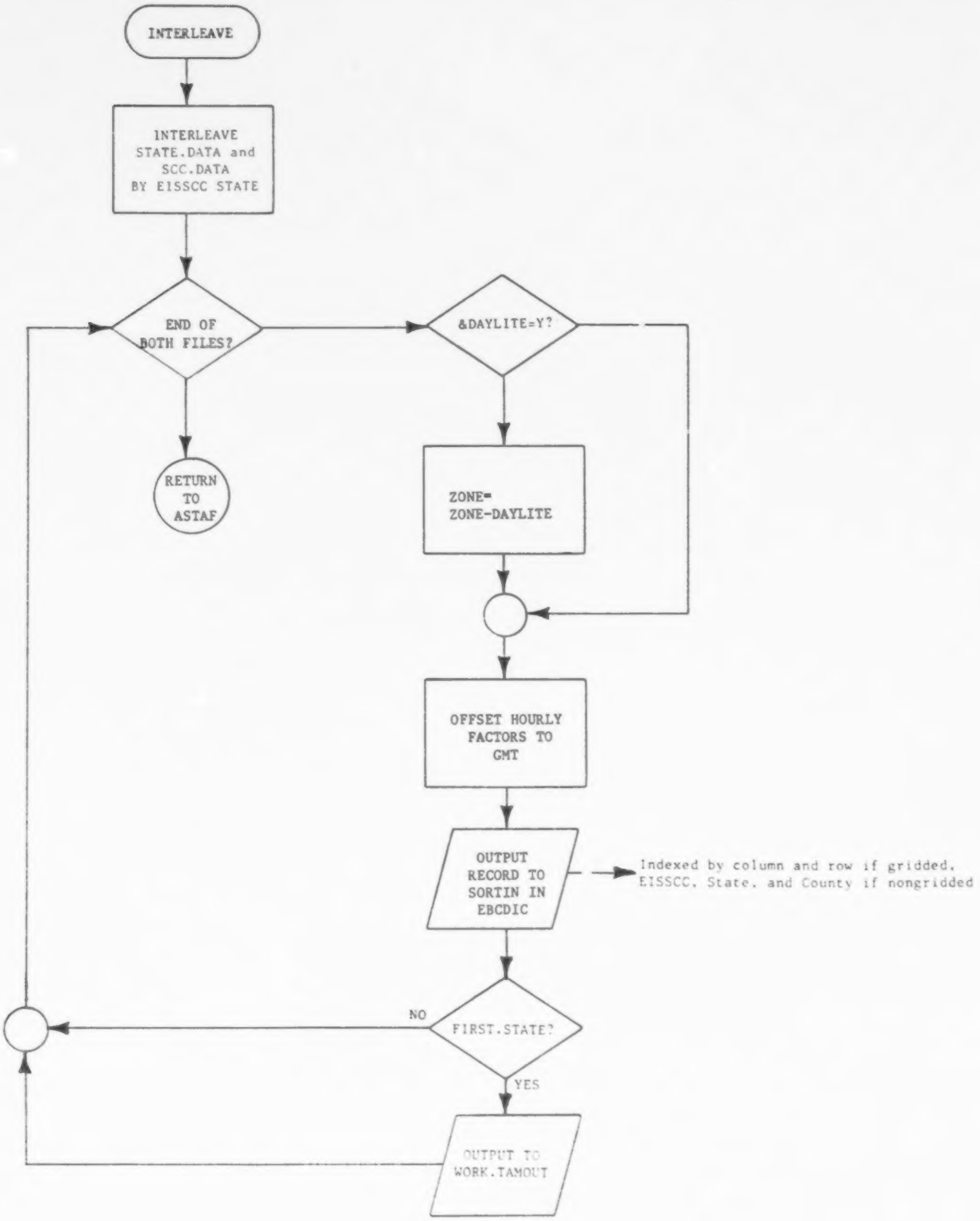
*DO NOT ADVANCE RECORD POINTER

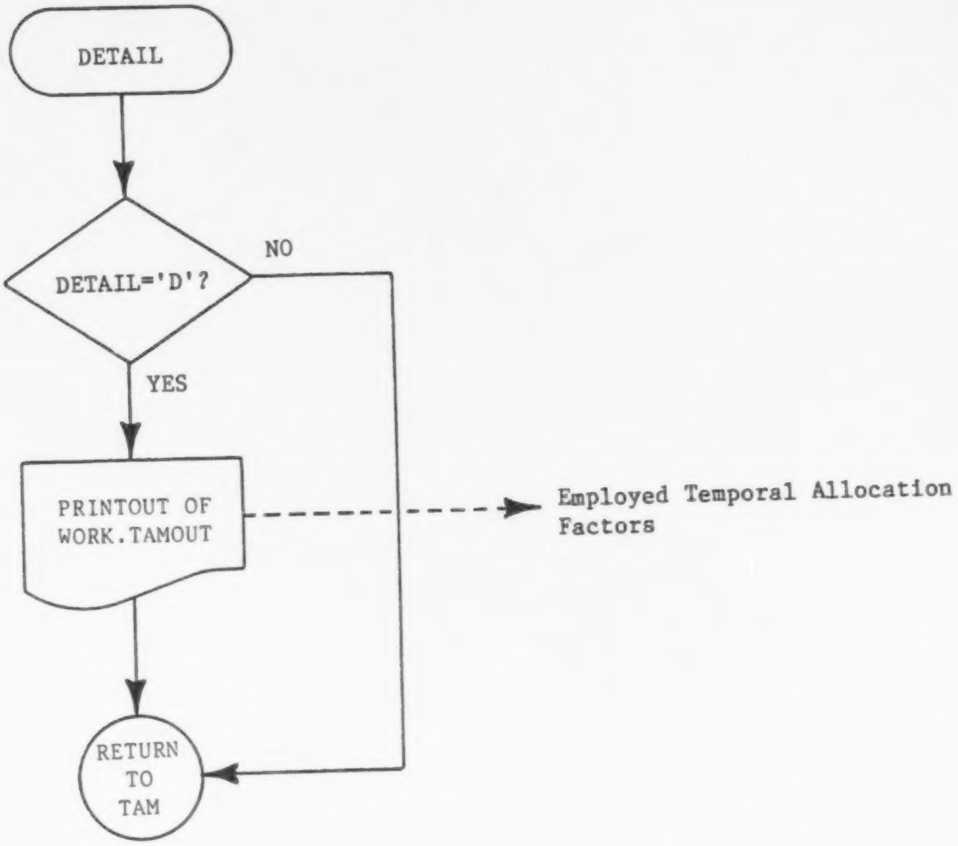


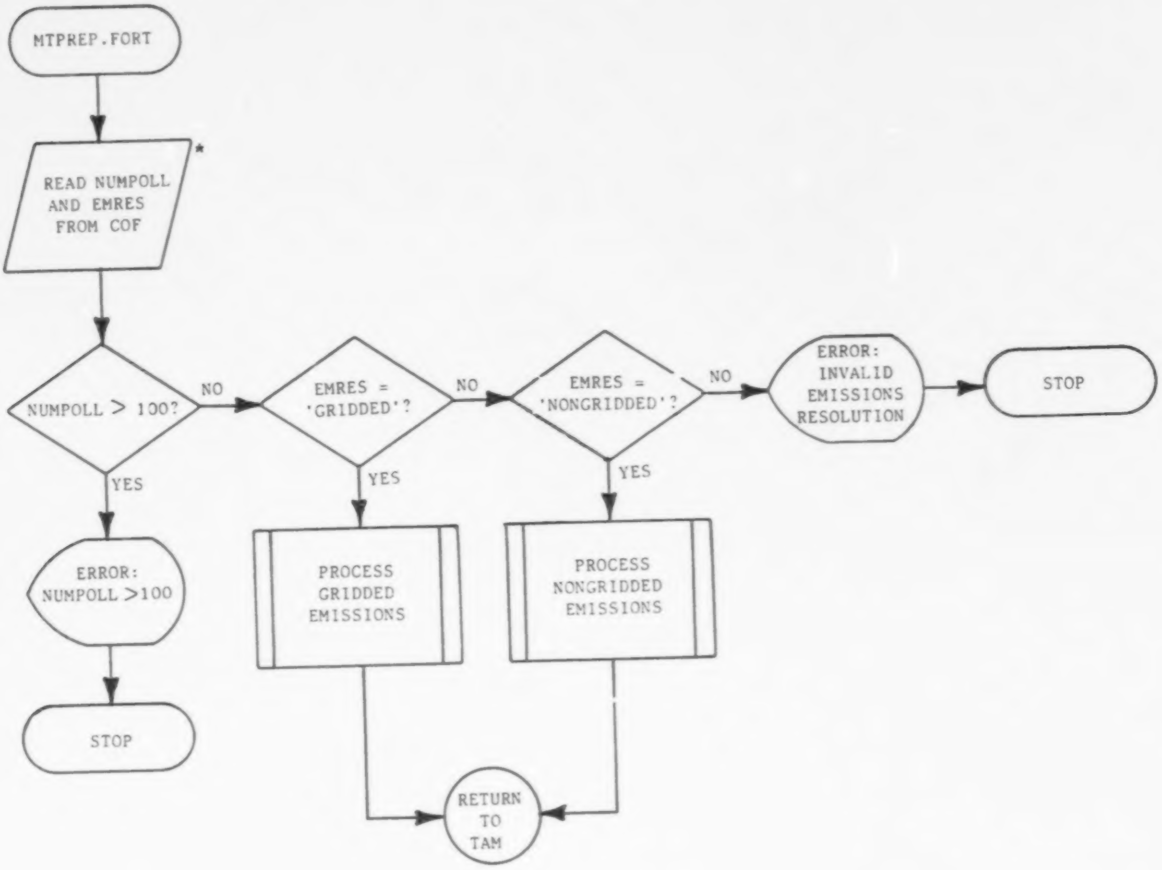
Merge WORK.STTAF with Emission File (TAMIN.&SASMEM)
by EISSCC STATE.
If WORK.STTAF contributes, IN2=TRUE
If TAMIN.&SASMEM contributes, IN1=TRUE



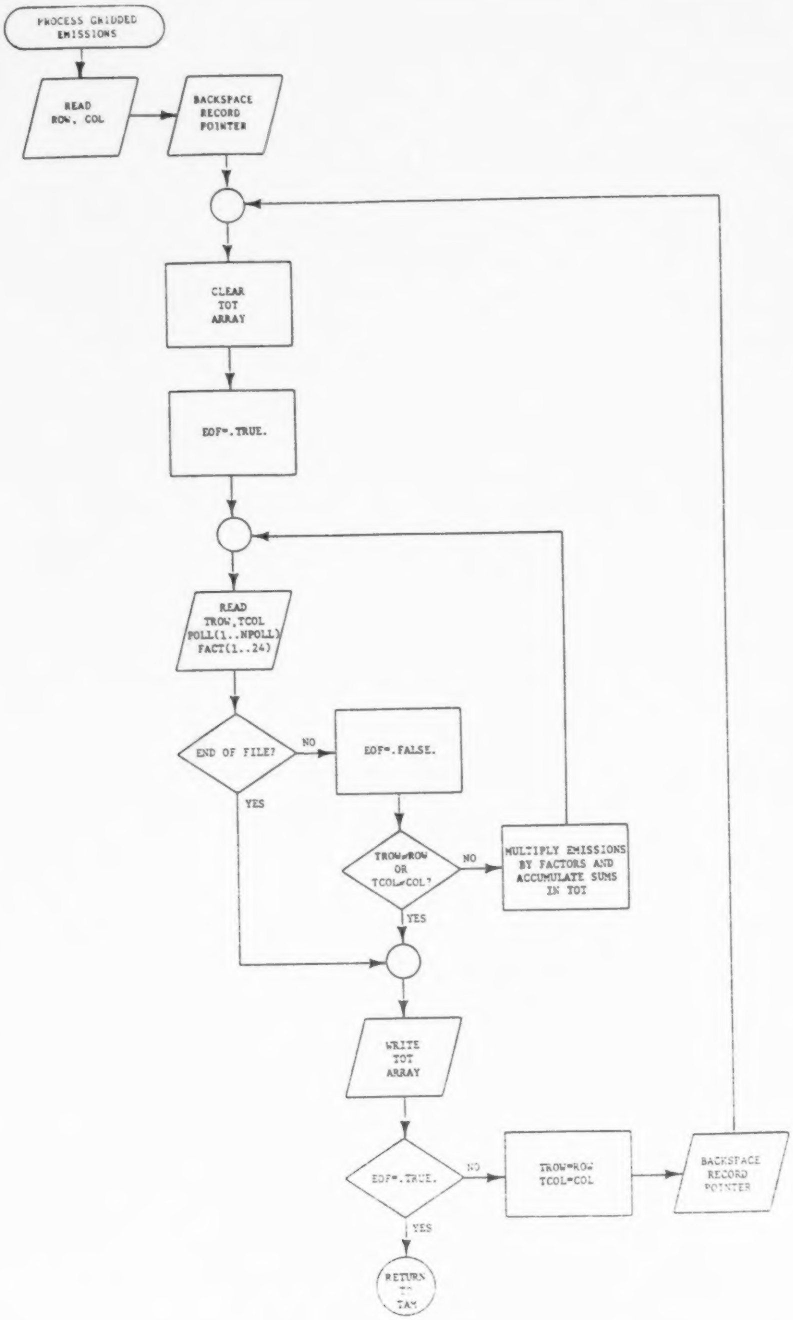
Merge WORK.SCCTAF with TEMP.NOSTATE by EISSCC.
If TEMP.NOSTATE contributes, IN1=TRUE

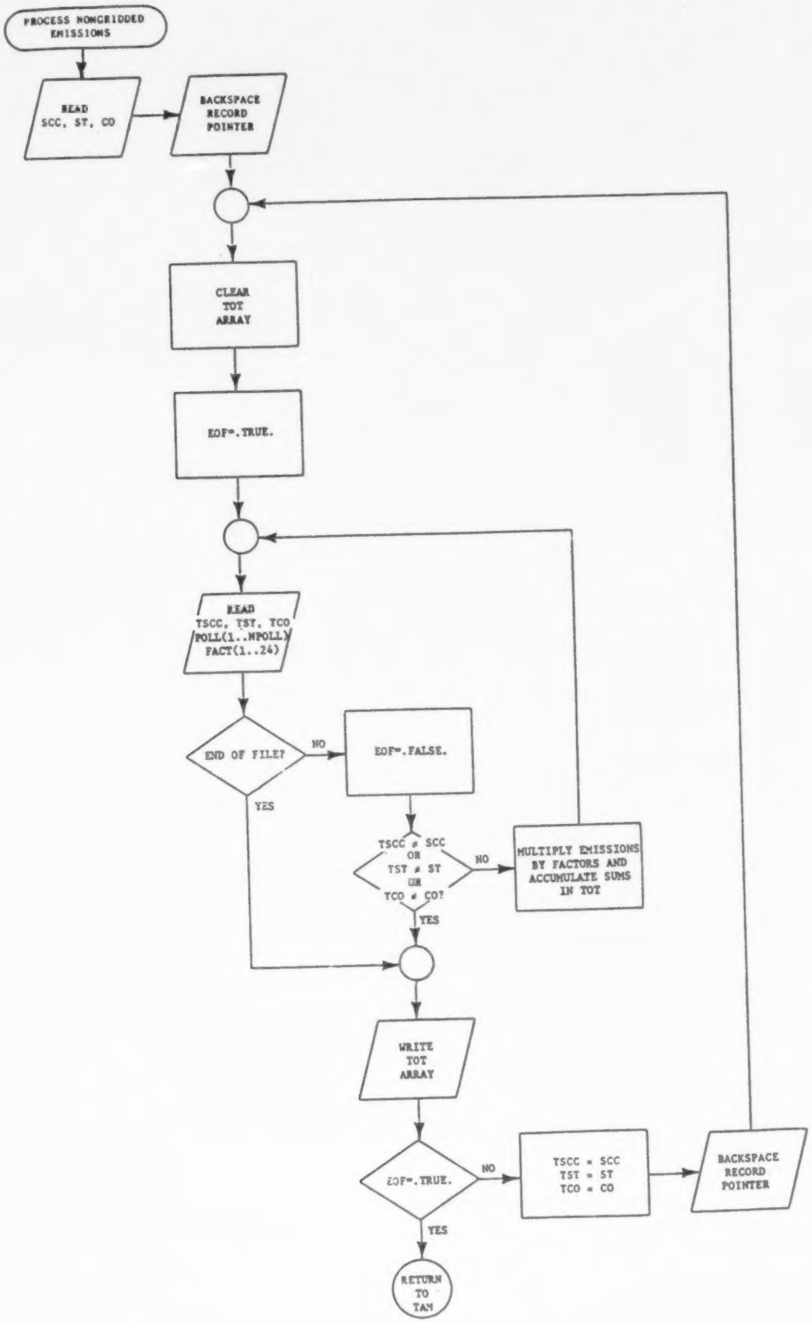

INTERLEAVE
INTERLEAVE STATE.DATA and SCC.DATA BY EISSCC STATE
END OF BOTH FILES?
RETURN TO ASTAF
&DAYLITE=Y?
ZONE= ZONE-DAYLITE
OFFSET HOURLY FACTORS TO GMT
OUTPUT RECORD TO SORTIN IN EBCDIC
Indexed by column and row if gridded, EISSCC, State, and County if nongridded
NO
FIRST.STATE?
YES
OUTPUT TO WORK.TAMOUT

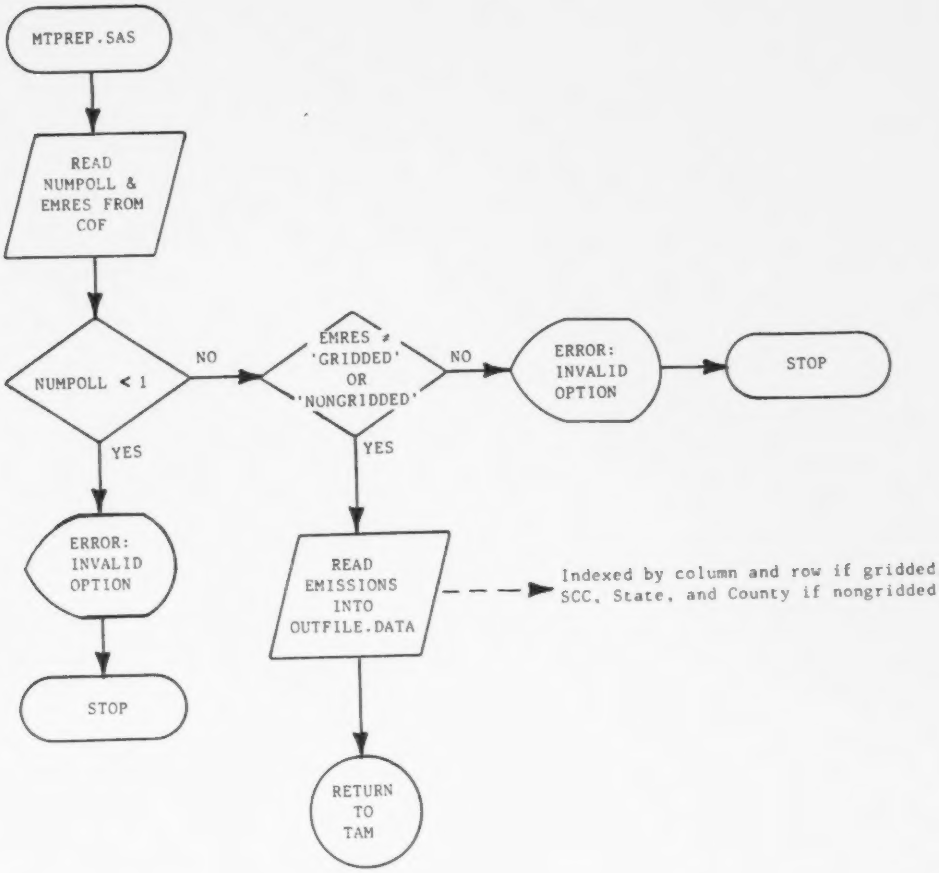

DETAIL
DETAIL='D'?
NO
YES
PRINTOUT OF WORK.TAMOUT
Employed Temporal Allocation Factors
RETURN TO TAM



*All other MTPREP.FORT input is read from sorted emissions file


PROCESS GRIDDED EMISSIONS
READ ROW, COL
BACKSPACE RECORD POINTER
CLEAR TOT ARRAY
EOF=.TRUE.
READ TROW,TCOL POLL(1..NPOLL) FACT(1..24)
END OF FILE?
NO
YES
EOF=.FALSE.
TROW≠ROW OR TCOL≠COL?
NO
YES
MULTIPLY EMISSIONS BY FACTORS AND ACCUMULATE SUMS IN TOT
WRITE TOT ARRAY
EOF=.TRUE.
NO
YES
TROW=ROW TCOL=COL
BACKSPACE RECORD POINTER
RETURN TO TAM


PROCESS NONGRIDDED EMISSIONS
READ SCC, ST, CO
BACKSPACE RECORD POINTER
CLEAR TOT ARRAY
EOF=.TRUE.
READ TSCC, TST, TCO POLL(1..NPOLL) FACT(1..24)
END OF FILE?
NO
EOF=.FALSE.
YES
TSCC ≠ SCC OR TST ≠ ST OR TCO ≠ CO?
NO
MULTIPLY EMISSIONS BY FACTORS AND ACCUMULATE SUMS IN TOT
YES
WRITE TOT ARRAY
EOF=.TRUE.
NO
TSCC = SCC TST = ST TCO = CO
BACKSPACE RECORD POINTER
YES
RETURN TO TAN


MTPREP.SAS
READ NUMPOLL & EMRES FROM COF
NUMPOLL < 1
NO
YES
ERROR: INVALID OPTION
STOP
EMRES ≠ 'GRIDDED' OR 'NONGRIDDED'
NO
ERROR: INVALID OPTION
STOP
YES
READ EMISSIONS INTO OUTFILE.DATA
RETURN TO TAM

Indexed by column and row if gridded, SCC, State, and County if nongridded

SPECIATION MODULE

The Speciation Module (SM) accepts emissions files processed by any of the FREDS modules and merges them with speciation factors generated by the Pollutant Splits System (PSPLIT) and factors contained in the Speciation Factor File (SFF), e.g., TSP alkalinity classes. The user has the flexibility to speciate any of the major pollutant categories since factors are generated and input peripherally. Currently, PSPLIT has the capability to speciate hydrocarbons into 29 photochemical reactivity classes or by carbon bond chemistry (10 classes), in addition to the NO/NO_2 split for NO_x. Speciation of any other pollutant may be accomplished by merging pollutant subclass speciation factors with emissions, via the SFF. The limiting factor is the availability of species profiles for other hydrocarbon classification schemes, TSP profiles, and any other pollutant the user wishes to speciate.

The SM enables speciation of any of the 15 input pollutants into subspecies classifications (e.g., THC into photochemical reactivity classes, TSP into alkalinity classes, NO_x into NO and NO_2, etc.) by providing a means to match merge the factors. The Control Options File enables user designation of the input pollutants to be speciated. For point source processing, input statements and program flow is controlled by the main program. For area sources, macros are invoked with a processing macro (SFFIN). Once the control file has been read in, macro variables are created to process the correct major pollutant categories and subspecies in each. The PSPLIT file contains pollutant classes and mole fractions for THC, and percentage splits for NO_x. The SFF allows the user to input fractions for species not resolved in PSPLIT (e.g., alkalinity classes for TSP). The subroutine, PSPMER, merges PSPLIT and SFF into a pollutant splits file for point and area sources.

Speciation is accomplished for point and area source pollutants by merging the appropriate series of fractional multipliers in the pollutant splits file into the emissions files. The macro SORTMER merges the combined species file with the emissions file as follows. Species allocation factors are matched to emissions records on the basis of EISSCC and pollutant SAROAD code. The SM reads an emissions record and, based on EISSCC, finds the appropriate set of species allocation factors in the merged pollutant splits file. Each EISSCC's subset of allocation factors are identified by the SAROAD code for the pollutant to which they apply. The SM then merges the appropriate allocation factors with the emissions record.

If an EISSCC is encountered for which no speciation pattern exists, the emission record is output to an orphan file and printed with the diagnostic report. Also included in the diagnostic report are summary statistics documenting the actions performed by the Speciation Module.

In addition to the above subroutines, the macro TIMEZONE is called to apply time zone data to area source emissions. This is not done in the TAM in order to reduce execution time.

The Pollutant Splits System (PSPLIT), which generates the species allocation factors, is an existing software system developed by EPA/ASRL. For NAPAP applications, PSPLIT was modified to:

- Enable SAROAD code identification of subspecies allocation factors, as opposed to references based on the position of fields on records,
- Expansion of the number of subspecies allowed, from 10 to 30.

Because of its relationship to the Speciation Module, PSPLIT output is included and supported within the overall FREDS framework.

Flow Chart and Description

The program flow for the point and area source versions of the SM are illustrated in the following flow charts. An individual "set" of flow charts is presented each for point and area sources. The first diagram of each set represents the overall module flow. Processes depicted by double vertical lines indicate the presence of several subprocesses, and hence a second level of more detailed diagrams are presented for these. For example, the first double-lined process is "READ CONTROL OPTIONS FILE". Starting on the next page, the reader will find a second-level chart with the same name. On completion of the second level of subprocesses, the user returns to the first level. The user would then continue on the first level until the next double-lined process is encountered - "MACRO SFFIN". Again, the reader refers to a second level diagram. This continues until the reader has encountered all processes depicted on the main module flow chart. If a second level process contains a double-lined process box, this refers to a third level subprocess. The user must return to the second level and, when completed, return to the first level to continue.

SM merges the appropriate series of fractional multipliers contained in the two pollutant splits files into emissions files. SM has the flexibility to use as input any emissions file created by a FREDS module. For both point and area sources, SM first reads the speciation Control Options File (COF) into a SAS data set and validates the user selected options. This file contains information for source type, identification of pollutants to speciate, number of subspecies classes, a run identification header, and a report diagnostics flag. The SYMPUT macro function is called to create SAS macro variables to process the requested pollutant categories and subspecies in each. The macro SFFIN is invoked next for point and area sources processing.

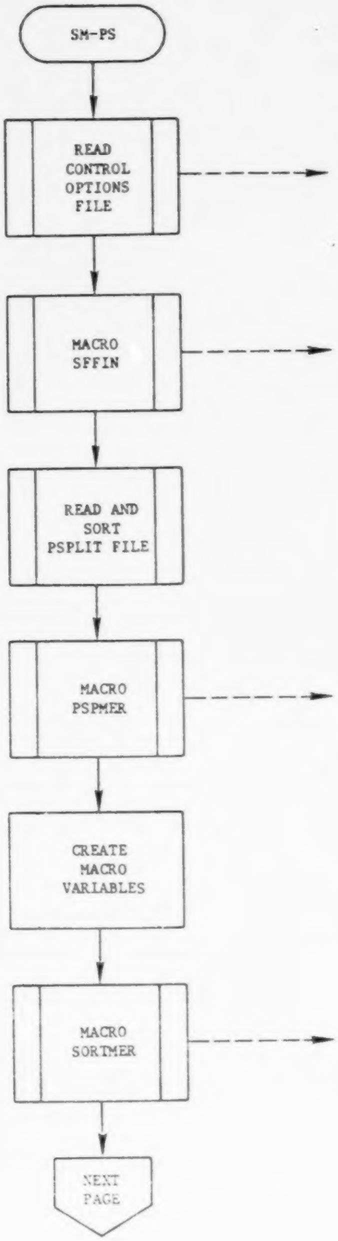
For point source runs, SFFIN serves as an input subroutine, reading the Speciation Factor File (SFF) into a temporary SAS data set, merging the SFF with the Control Options File and assigning pollutant categories. This file is output to another temporary data set and sorted by EISSCC. The program returns to the main body of SM, reads in the PSPLIT file and sorts by EISSCC. PSPMER is invoked next by the main program to merge the PSPLIT output file and the Speciation Factor File, creating a pollutant splits file. This allows for speciation of PSPLIT pollutants (THC and NO_x) in addition to those not resolved by PSPLIT (e.g., TSP alkalinity classes). Class SAROAD codes from this merge are output for inclusion in the diagnostic report. SORTMER, the next processing macro invoked for point sources, merges the point source emissions file with the pollutant splits file created in PSPMER and outputs the emission records and merged speciation factors.

For area source processing, the macro SFFIN reads all input files and controls execution of the macro routines PSPMER, TIMEZONE, and SORTMER based on user supplied options in the COF. SFFIN first reads the PSPLIT file, outputs it to a temporary SAS data set, and sorts by EISSCC. Next, the SFF is read into a temporary SAS data set and also sorted by EISSCC. PSPMER is invoked to merge the PSPLIT and Speciation Factor Files, to create a pollutant splits file, similar to point source processing. The TIMEZONE macro is then invoked to input and sort data in the Time Zone File (TZF) by State and County. The TZF is then merged with the area source emissions file, output to a SAS data set, and resorted by EISSCC, State, and County. (For point sources, this is accomplished in the Temporal Allocation Module.) The merged emissions file is output for further processing in the Speciation Module.

Area source processing is completed by the SORTMER macro which merges the emissions file previously output by TIMEZONE with the pollutant splits file created in PSPMER. SORTMER also multiplies emissions by the speciation factors and outputs a speciated emissions file for further FREDS processing.

Once processing is complete, a diagnostic report is printed including a listing of the Control Options File, SAROAD codes for subspecies, and emission records with no speciation profiles. In addition, emission records with no time zone data are printed for area sources. A printout of speciation factors applied to emission records may be requested by the detail option. Annual totals of speciated area source emissions may also be requested in the COF.

Speciation Module: Point Sources--

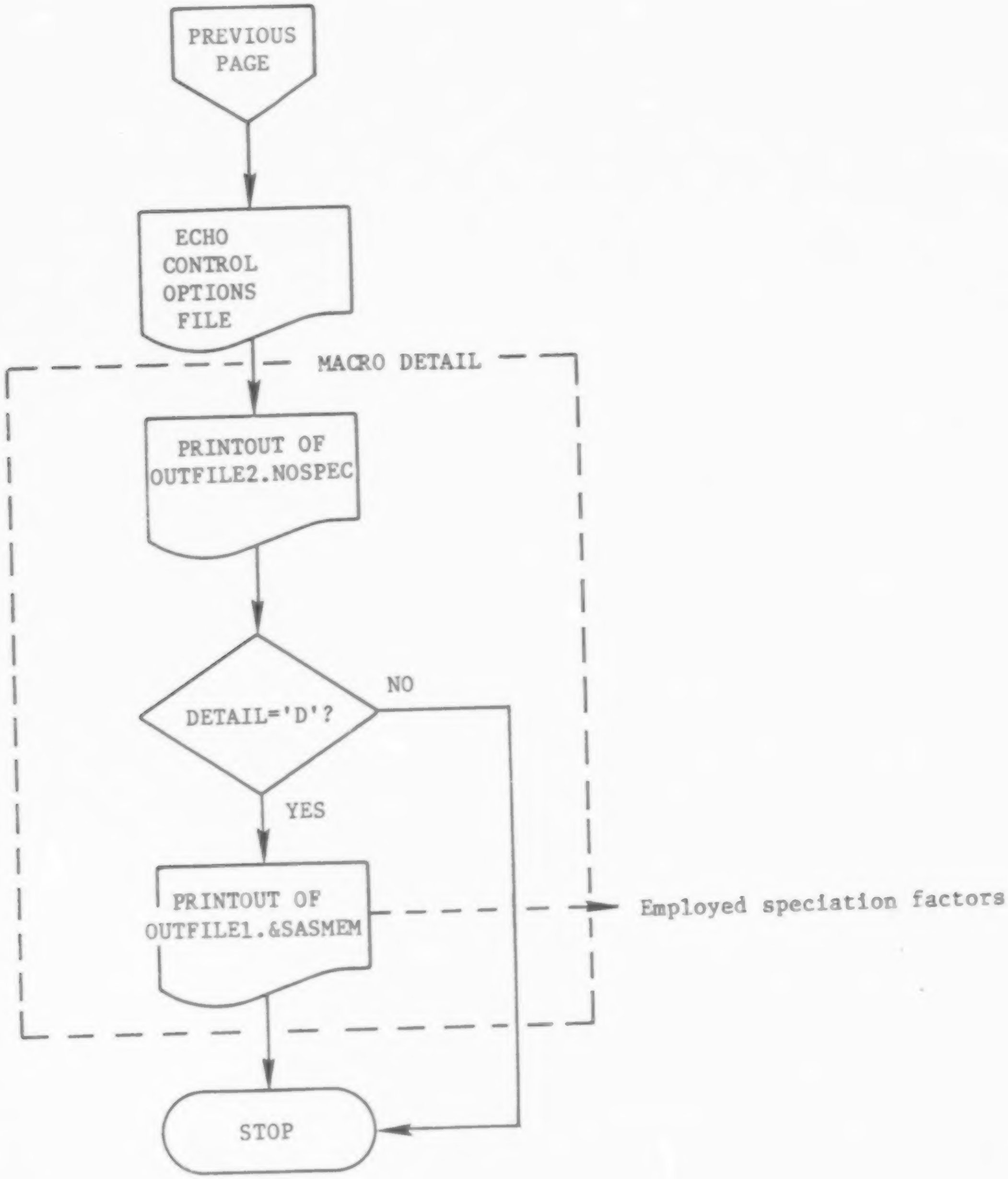


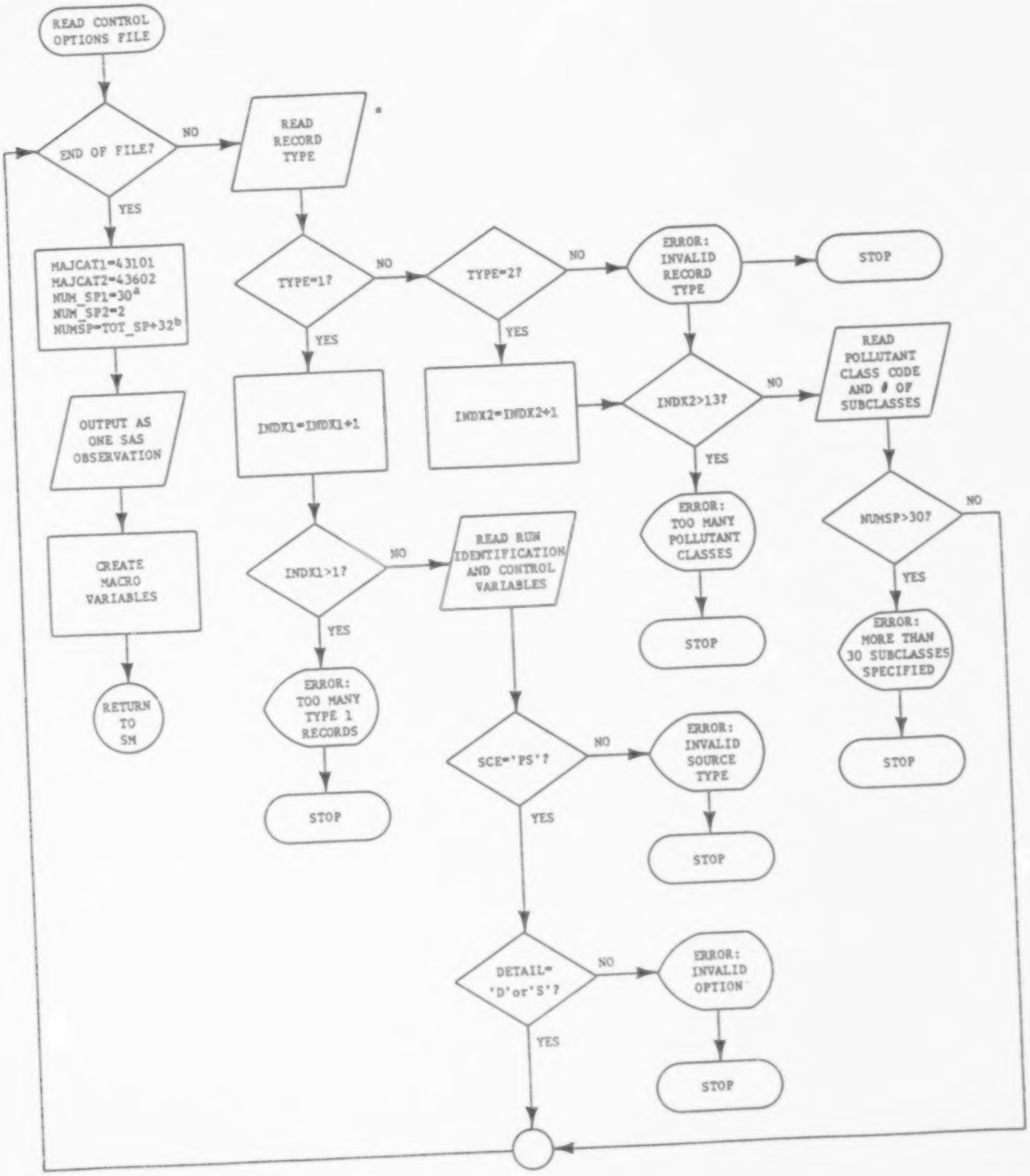
Read run identification, control variables and speciation file format. Create macro variables

Read the Speciation Factor File (SFF). Merge with control options file, assign pollutant categories, and sort

Merge PSPLIT File with SFF if SFF exists

Merge Emission File with Speciation File

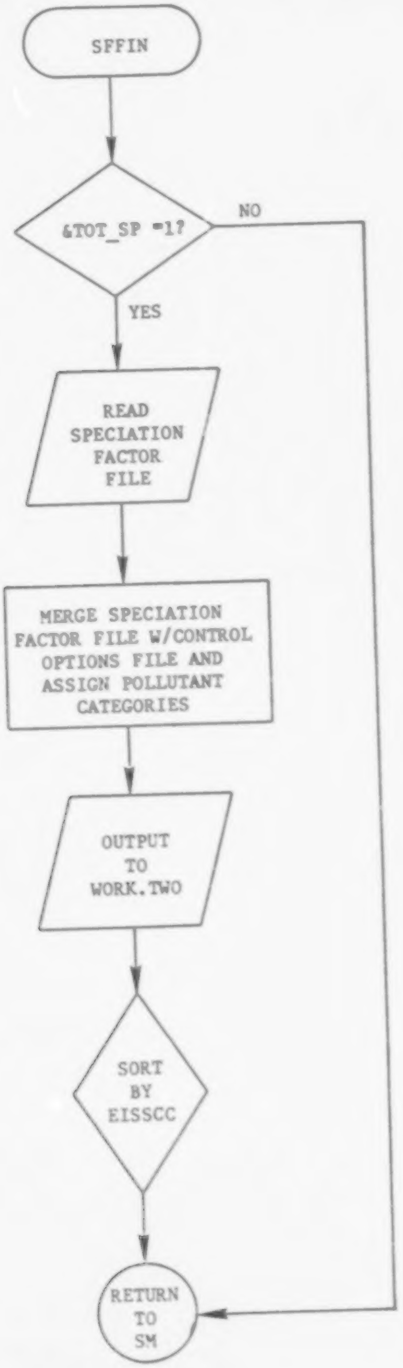

PREVIOUS PAGE
ECHO CONTROL OPTIONS FILE
MACRO DETAIL
PRINTOUT OF OUTFILE2.NOSPEC
DETAIL='D'?
NO
YES
PRINTOUT OF OUTFILE1.&SASMEM
Employed speciation factors
STOP

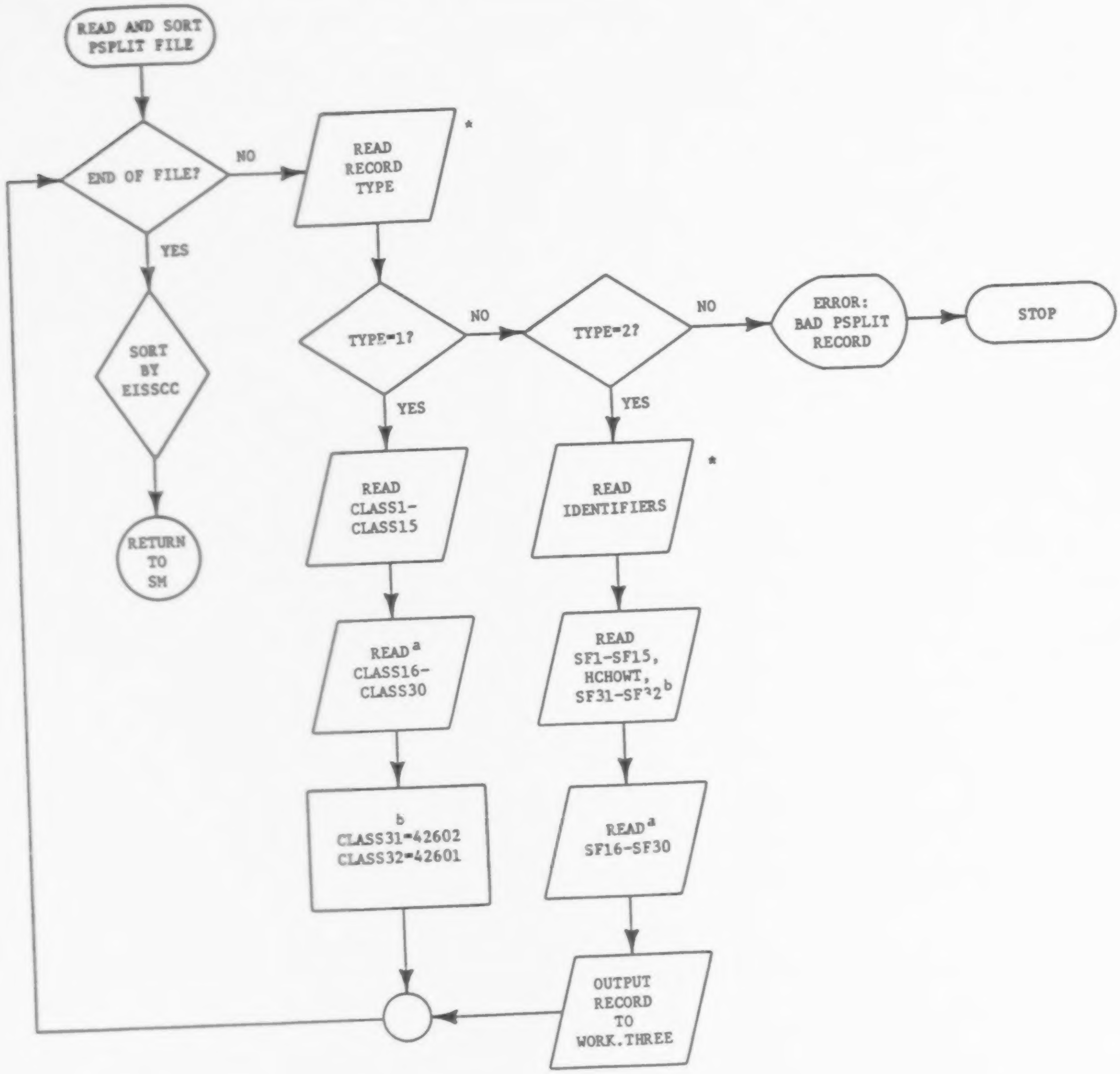


*DO NOT ADVANCE RECORD POINTER

[a] NUM_SP1=30 refers to Version 5.2. For version 5.3, NUM_SP1=10.

[b] NUMSP=TOT_SP+32 refers to Version 5.2. For Version 5.3, NUMSP=TOT_SP+12.


SFFIN
&TOT_SP =1?
NO
YES
READ SPECIATION FACTOR FILE
MERGE SPECIATION FACTOR FILE W/CONTROL OPTIONS FILE AND ASSIGN POLLUTANT CATEGORIES
OUTPUT TO WORK.TWO
SORT BY EISSCC
RETURN TO SM

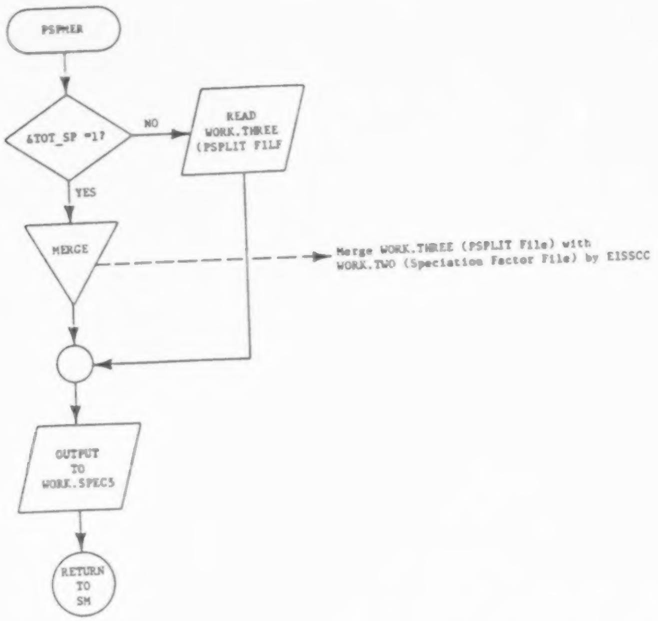


---

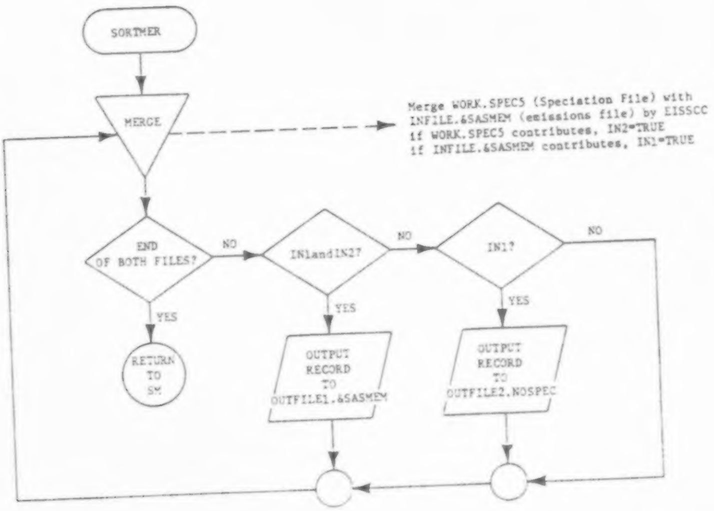
*DO NOT ADVANCE RECORD POINTER

[a] These records are not read for Version 5.3.

[b] For Version 5.3, CLASS31, CLASS32, SF31 and SF32 become CLASS11, CLASS12, SF11, and SF12, respectively.

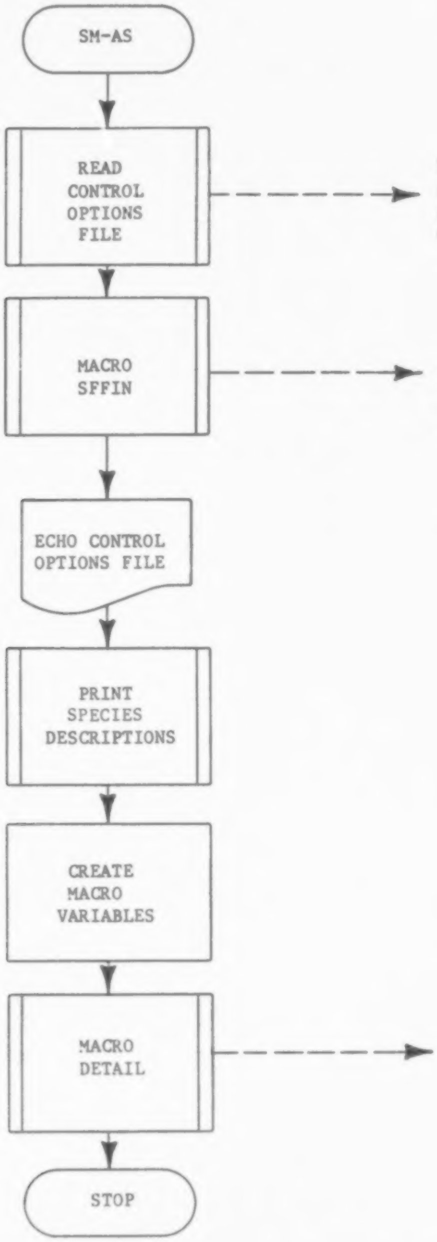


Merge WORK.THREE (PSPLIT File) with
WORK.TWO (Speciation Factor File) by EISSCC



Merge WORK.SPEC5 (Speciation File) with
INFILE.&SASMEM (emissions file) by EISSCC
if WORK.SPEC5 contributes, IN2=TRUE
if INFILE.&SASMEM contributes, IN1=TRUE

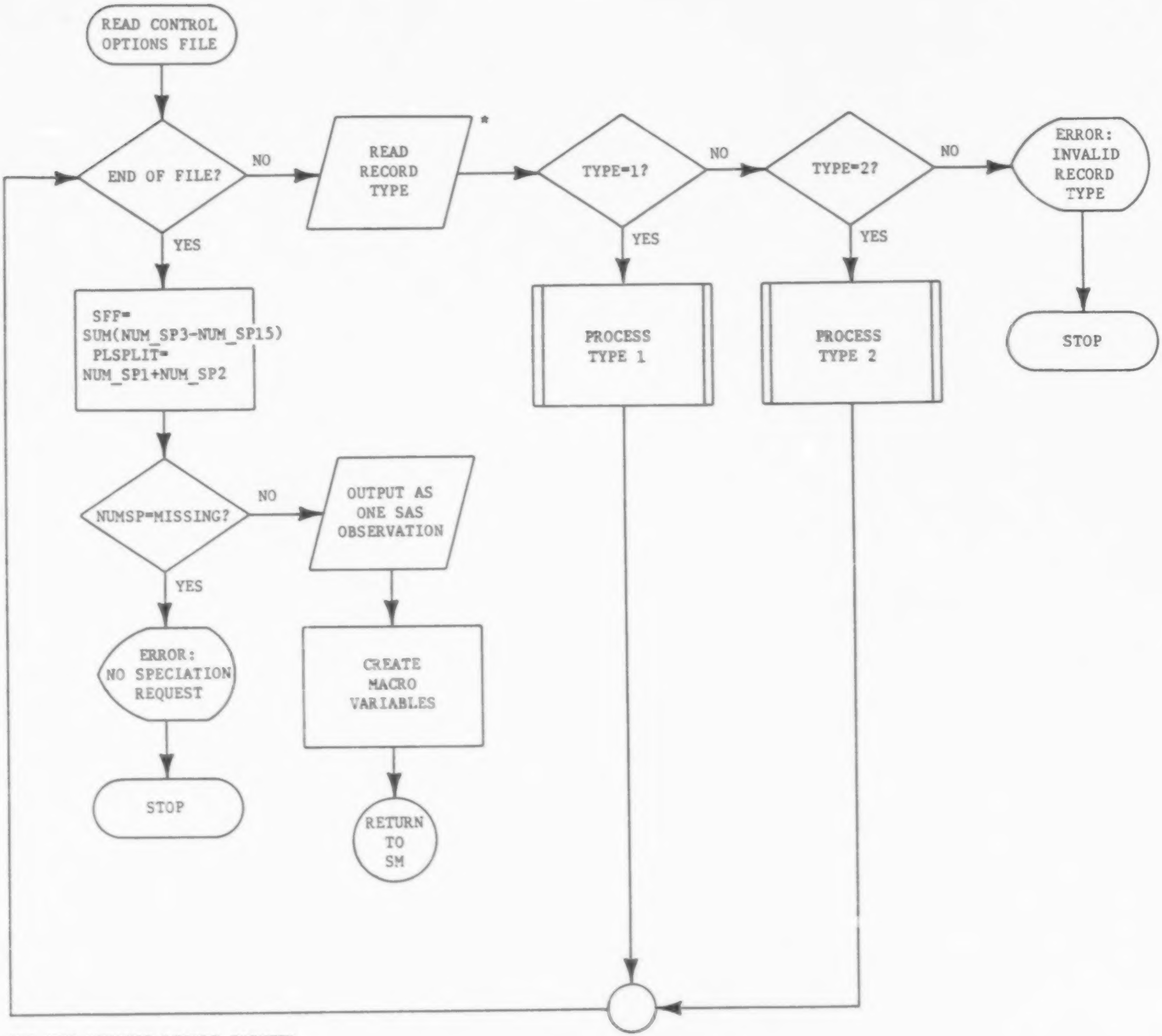
Speciation Module: Area Sources--


SM-AS
READ CONTROL OPTIONS FILE
MACRO SFFIN
ECHO CONTROL OPTIONS FILE
PRINT SPECIES DESCRIPTIONS
CREATE MACRO VARIABLES
MACRO DETAIL
STOP

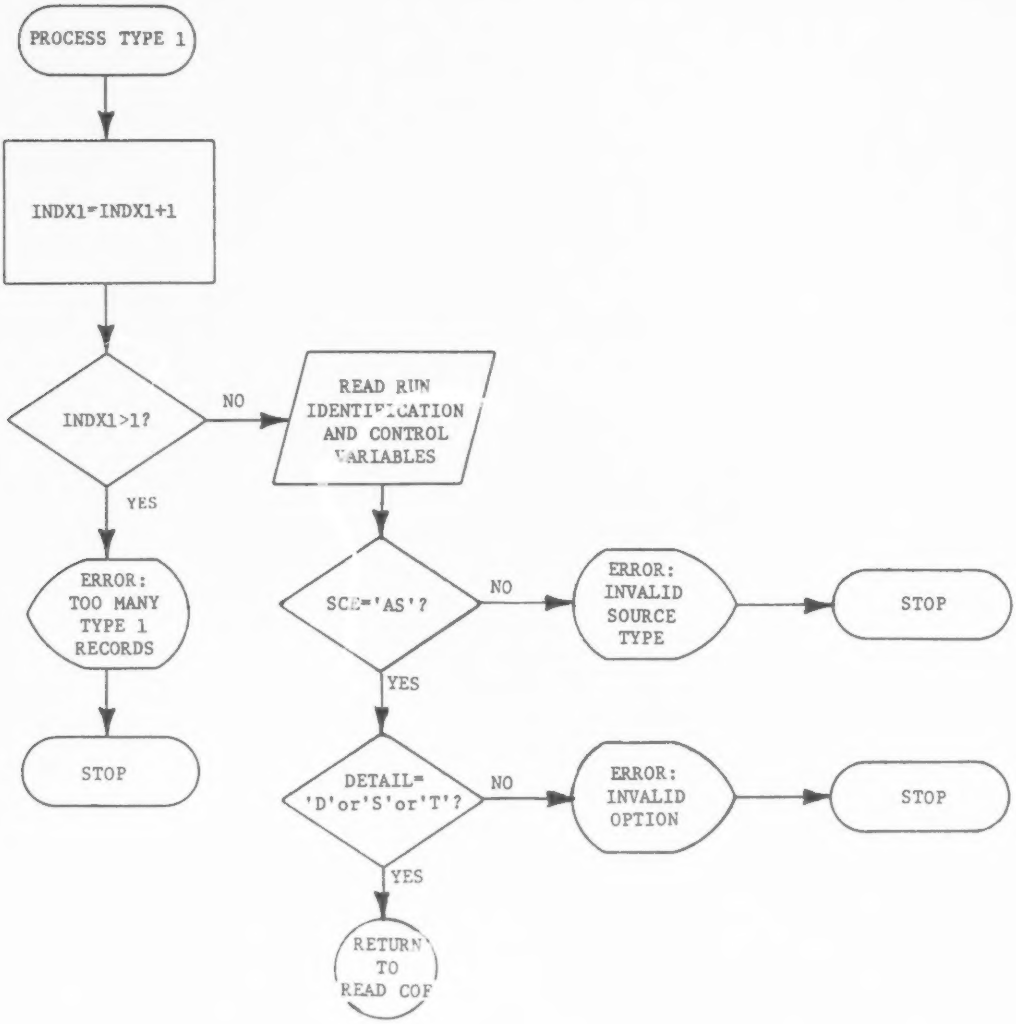
Read run-identification and control variables and speciation file format. Create macro variables.

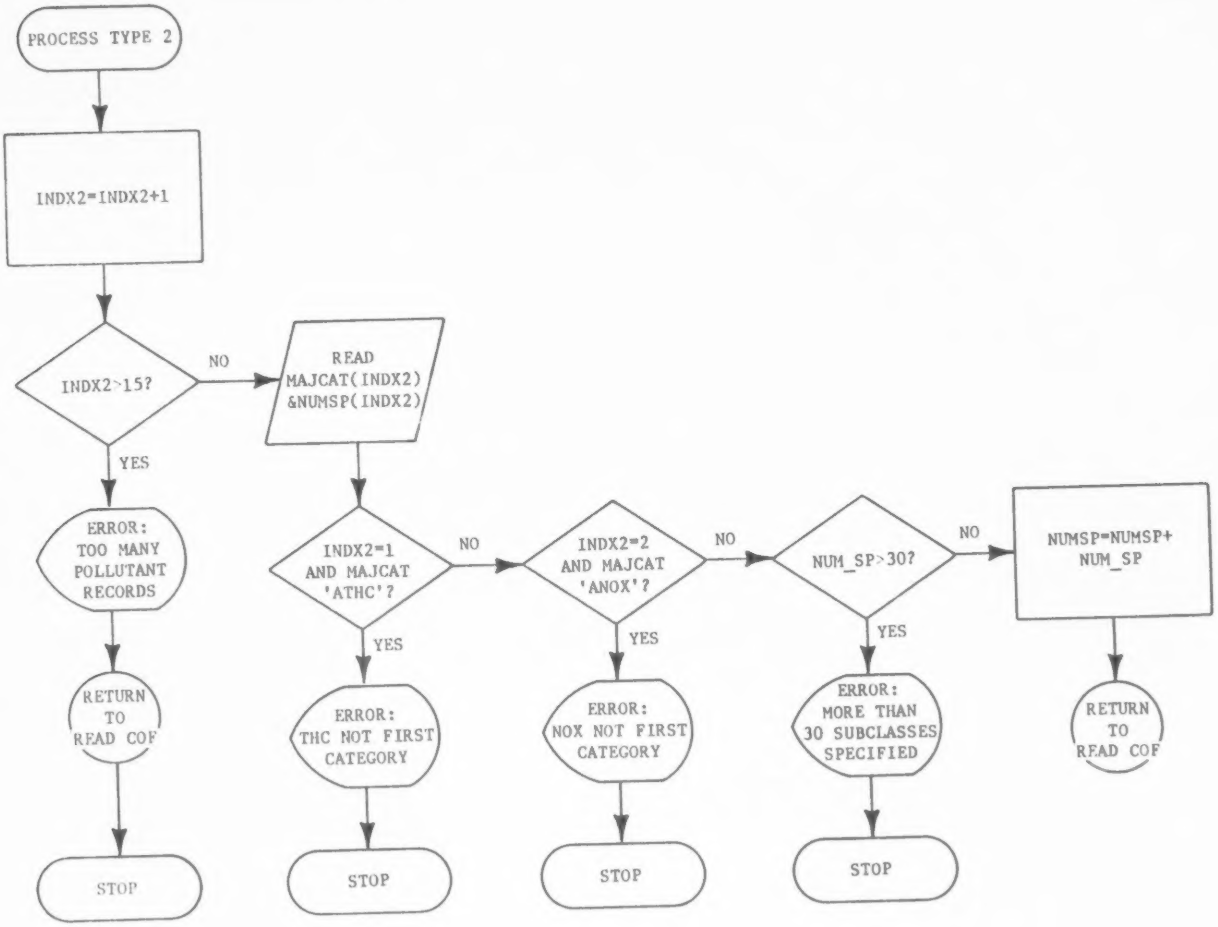
Read PSPLIT File, Speciation Factor File and merge the two. Invoke TIMEZONE and SORTMER macros to read in Time Zone File and apply speciation factors to emissions.

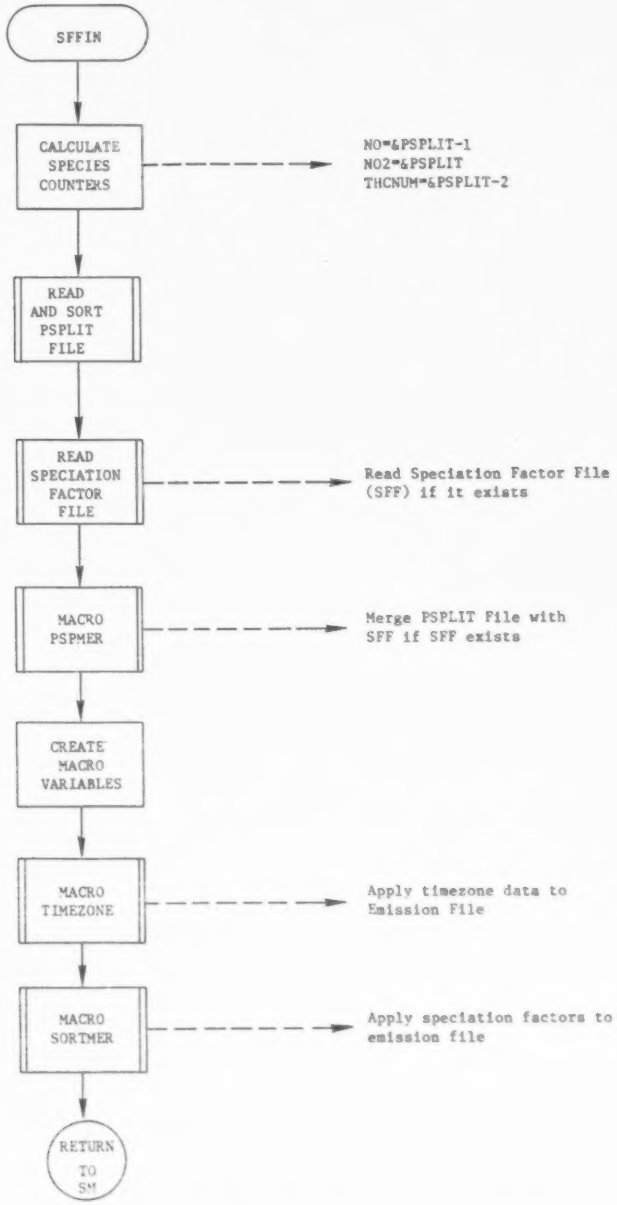
Print reports as specified

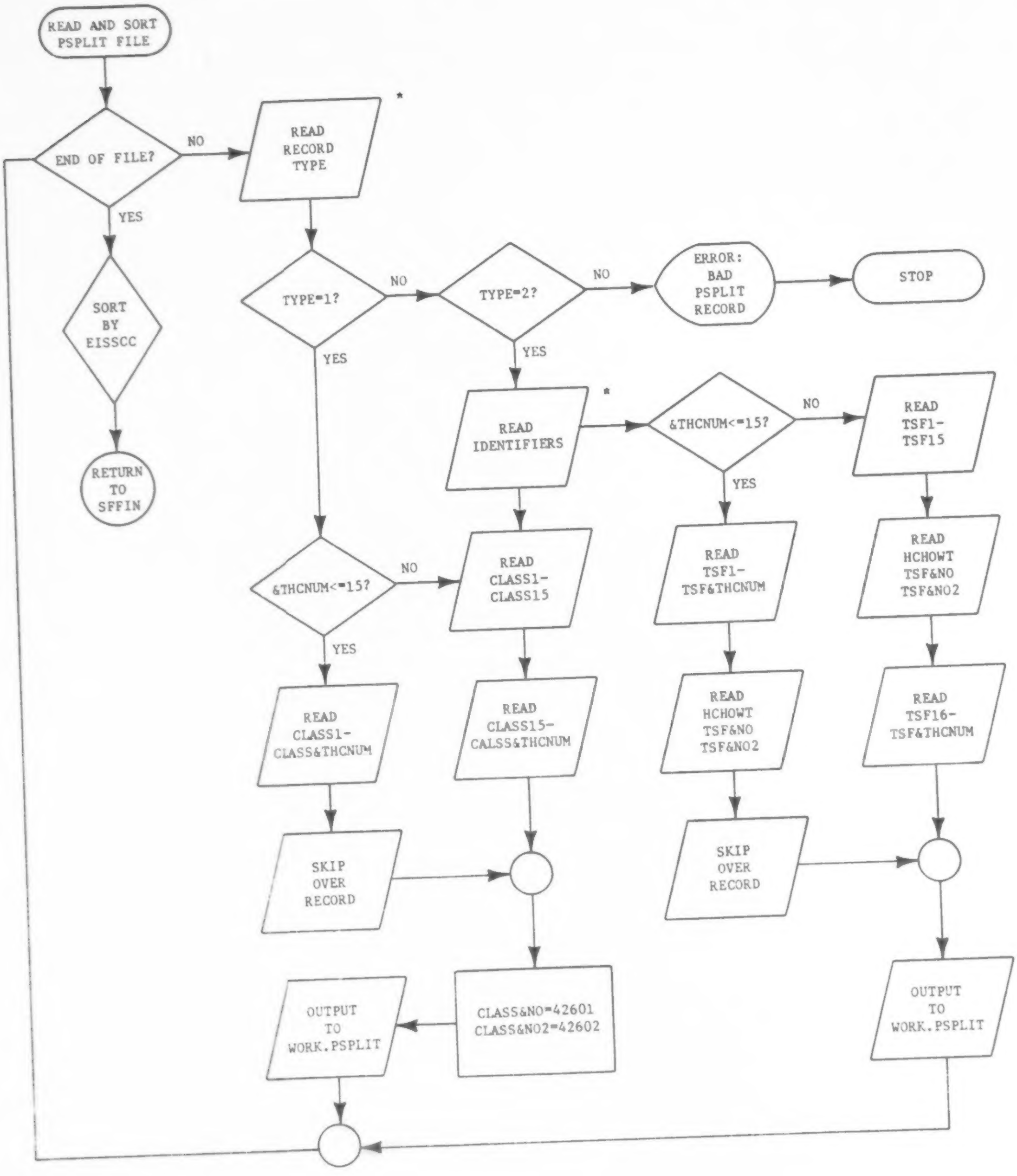

READ CONTROL OPTIONS FILE
END OF FILE?
NO
READ RECORD TYPE
*
TYPE=1?
NO
TYPE=2?
NO
ERROR: INVALID RECORD TYPE
YES
YES
YES
SFF= SUM(NUM_SP3-NUM_SP15) PLSPLIT= NUM_SP1+NUM_SP2
PROCESS TYPE 1
PROCESS TYPE 2
STOP
NUMSP=MISSING?
NO
OUTPUT AS ONE SAS OBSERVATION
YES
ERROR: NO SPECIATION REQUEST
CREATE MACRO VARIABLES
STOP
RETURN TO SM

*DO NOT ADVANCE RECORD POINTER

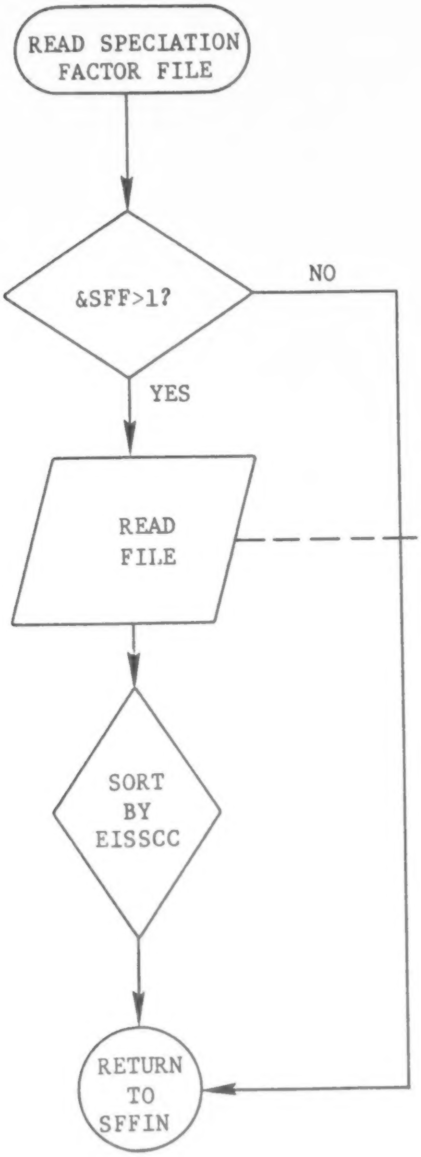

PROCESS TYPE 1
INDX1=INDX1+1
INDX1>1?
NO
YES
READ RUN IDENTIFICATION AND CONTROL VARIABLES
ERROR: TOO MANY TYPE 1 RECORDS
STOP
SCE='AS'?
NO
YES
ERROR: INVALID SOURCE TYPE
STOP
DETAIL= 'D'or'S'or'T'?
NO
YES
ERROR: INVALID OPTION
STOP
RETURN TO READ COF


PROCESS TYPE 2
INDX2=INDX2+1
INDX2>15?
NO
YES
READ MAJCAT(INDX2) &NUMSP(INDX2)
ERROR: TOO MANY POLLUTANT RECORDS
RETURN TO READ COF
STOP
INDX2=1 AND MAJCAT 'ATHC'?
NO
YES
ERROR: THC NOT FIRST CATEGORY
STOP
INDX2=2 AND MAJCAT 'ANOX'?
NO
YES
ERROR: NOX NOT FIRST CATEGORY
STOP
NUM_SP>30?
NO
YES
ERROR: MORE THAN 30 SUBCLASSES SPECIFIED
STOP
NUMSP=NUMSP+ NUM_SP
RETURN TO READ COF

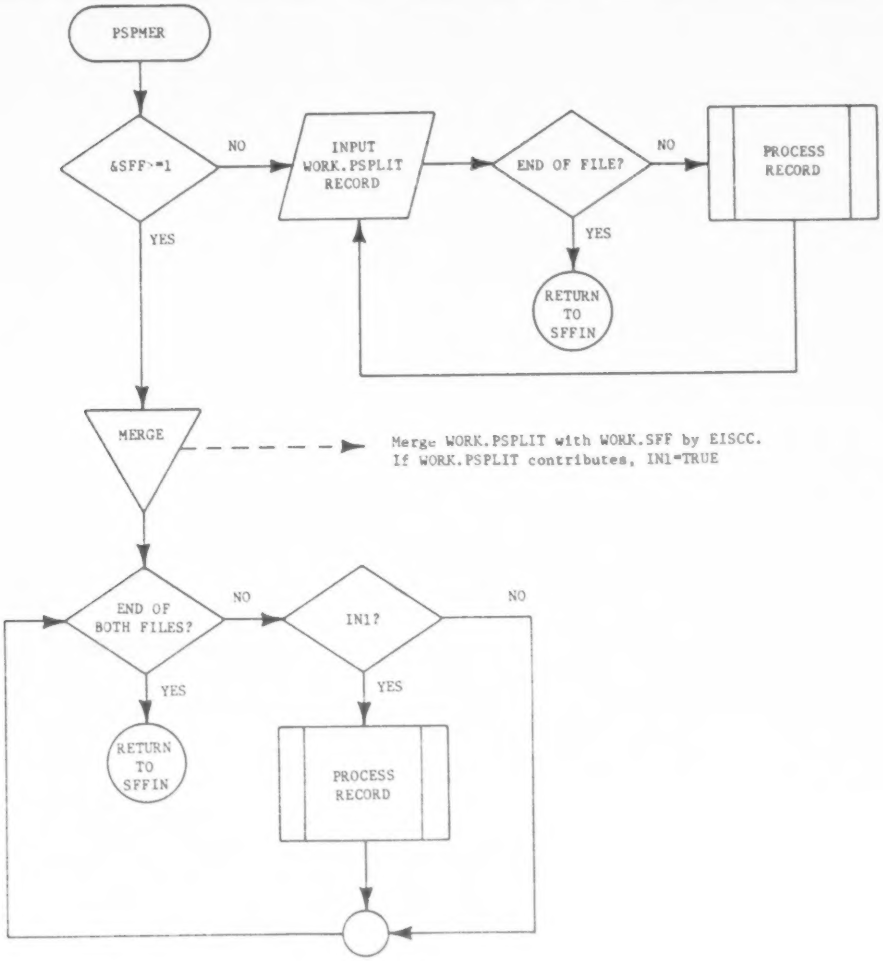

SFFIN
CALCULATE SPECIES COUNTERS
NO=&PSPLIT-1
NO2=&PSPLIT
THCNUM=&PSPLIT-2
READ AND SORT PSPLIT FILE
READ SPECIATION FACTOR FILE
Read Speciation Factor File (SFF) if it exists
MACRO PSPMER
Merge PSPLIT File with SFF if SFF exists
CREATE MACRO VARIABLES
MACRO TIMEZONE
Apply timezone data to Emission File
MACRO SORTMER
Apply speciation factors to emission file
RETURN TO SM

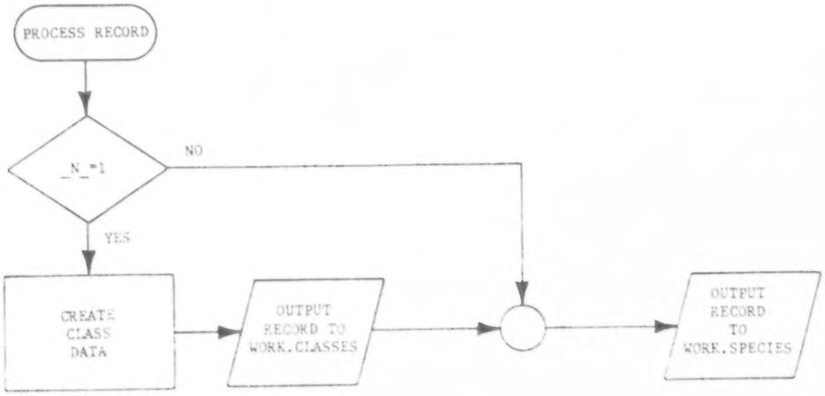


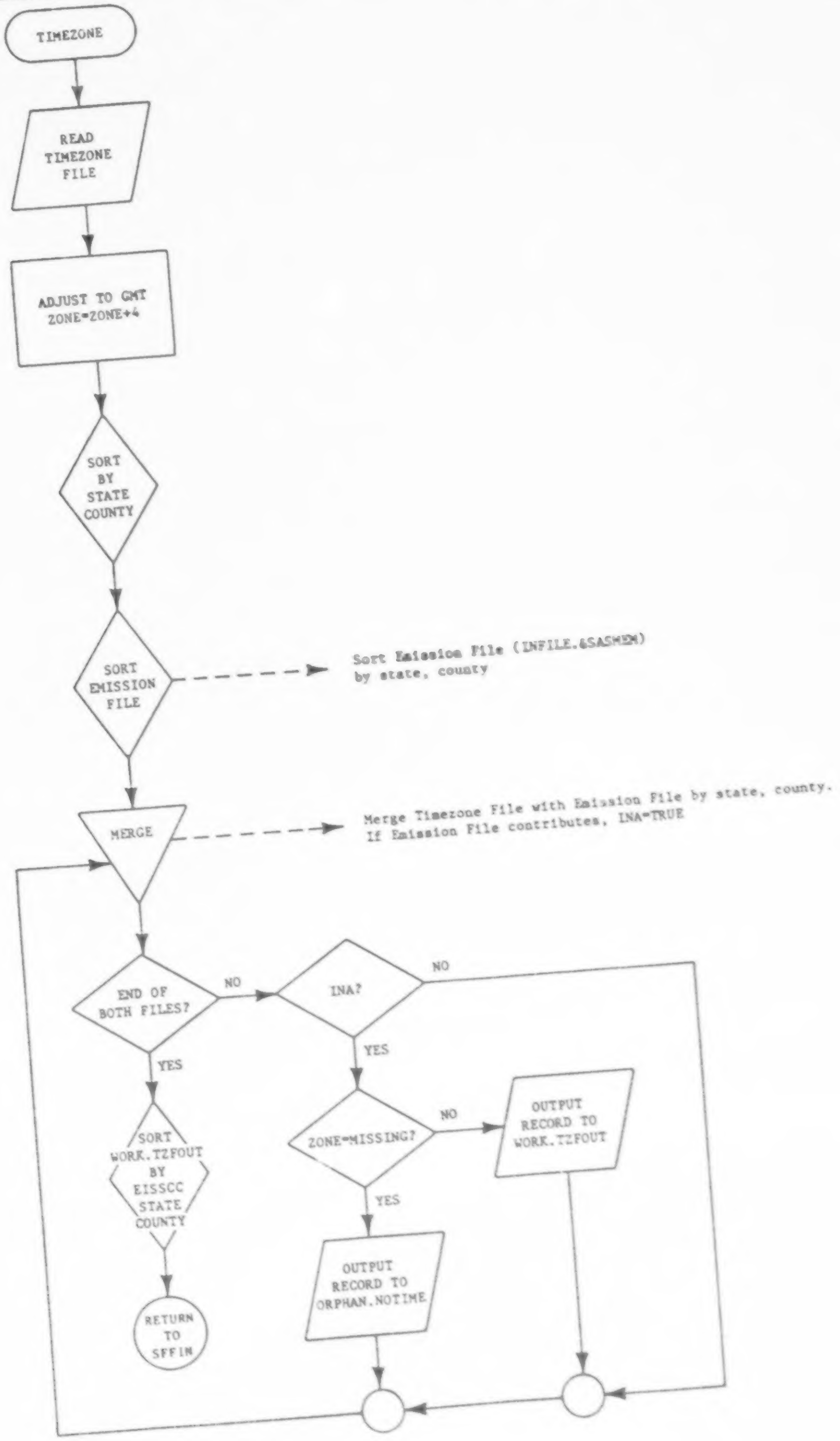
*DO NOT ADVANCE RECORD POINTER



Read Speciation Factor File
(SFF) into WORK.SFF

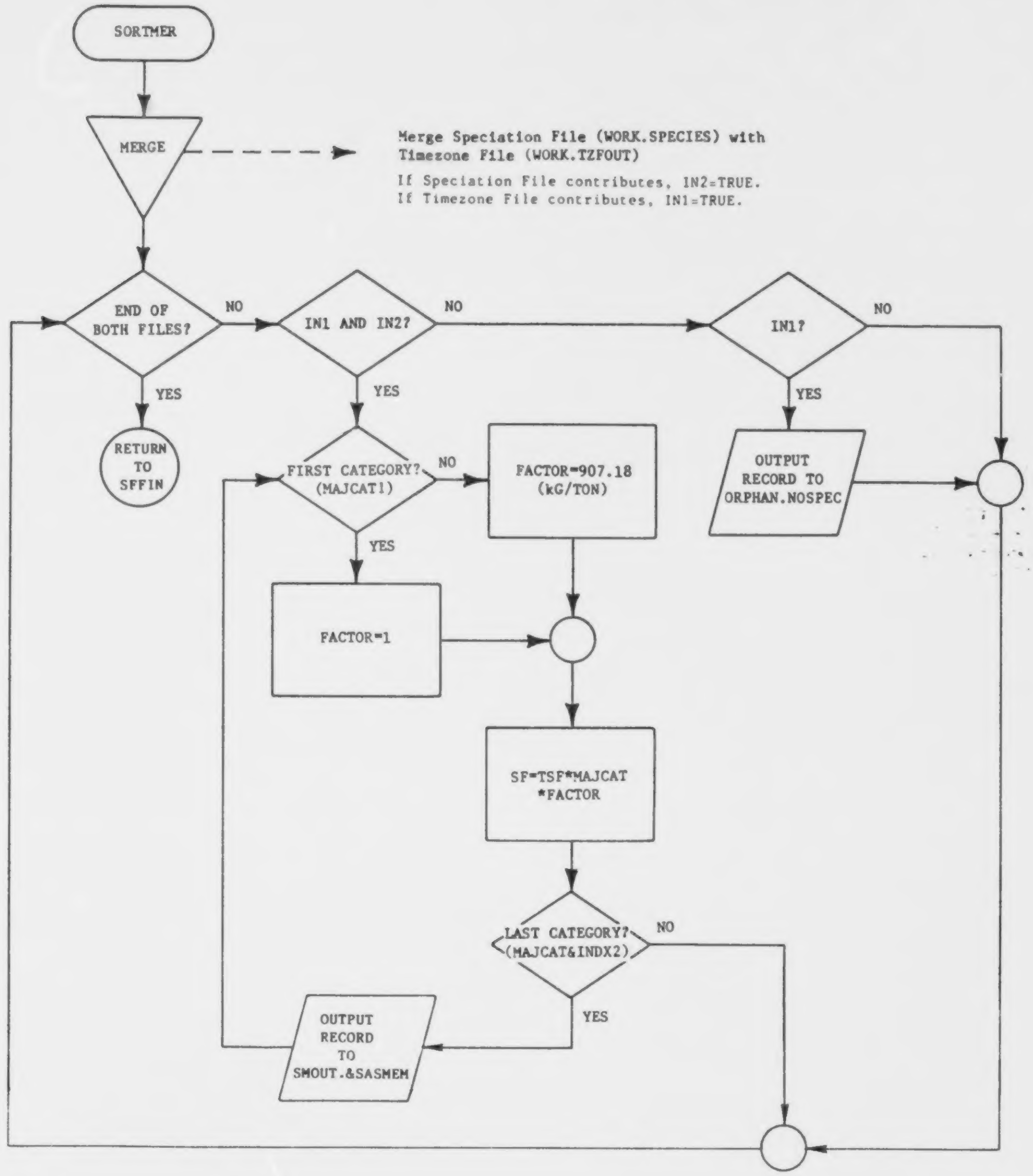

PSPMER
&SFF¬=1
NO
YES
INPUT WORK.PSPLIT RECORD
END OF FILE?
NO
YES
PROCESS RECORD
RETURN TO SFFIN
MERGE
Merge WORK.PSPLIT with WORK.SFF by EISCC.
If WORK.PSPLIT contributes, IN1=TRUE
END OF BOTH FILES?
NO
YES
IN1?
NO
YES
RETURN TO SFFIN
PROCESS RECORD


PROCESS RECORD
_N_=1
NO
YES
CREATE CLASS DATA
OUTPUT RECORD TO WORK.CLASSES
OUTPUT RECORD TO WORK.SPECIES



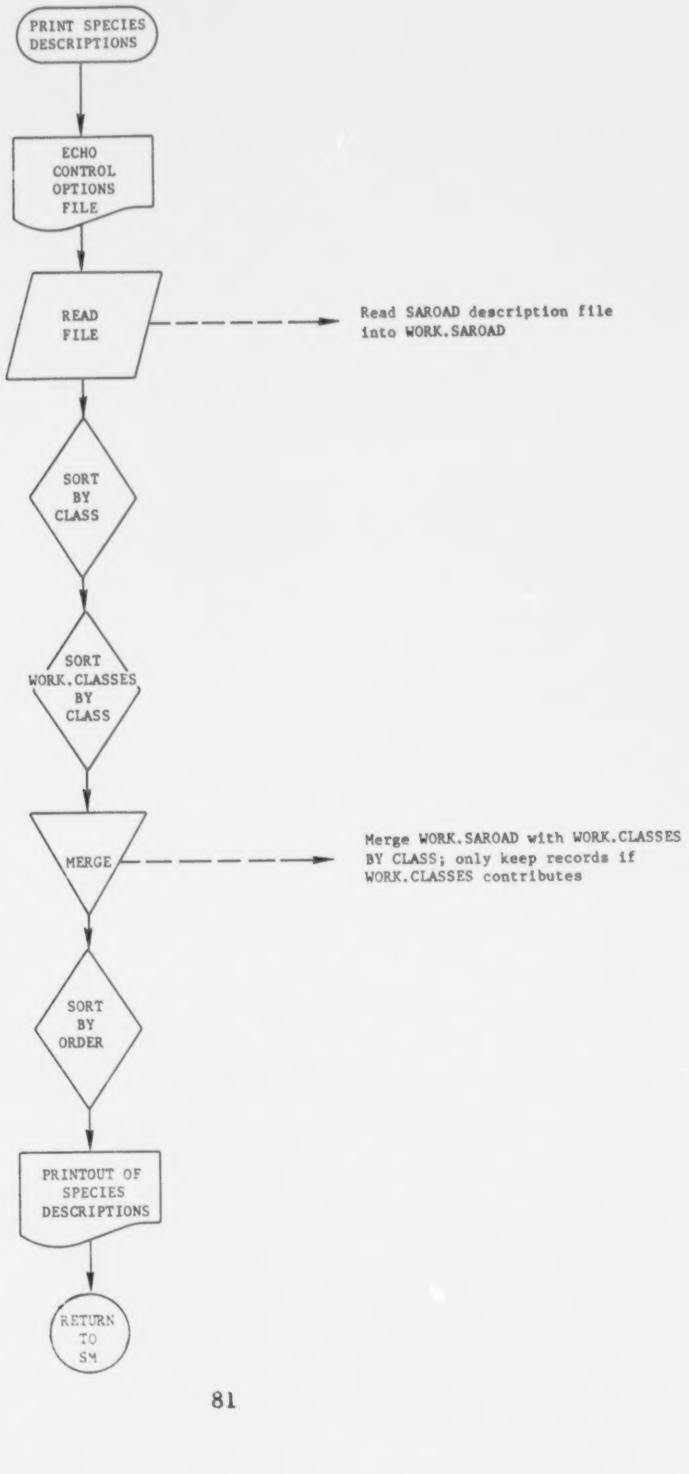
Sort Emission File (INFILE.&SASMEM)
by state, county

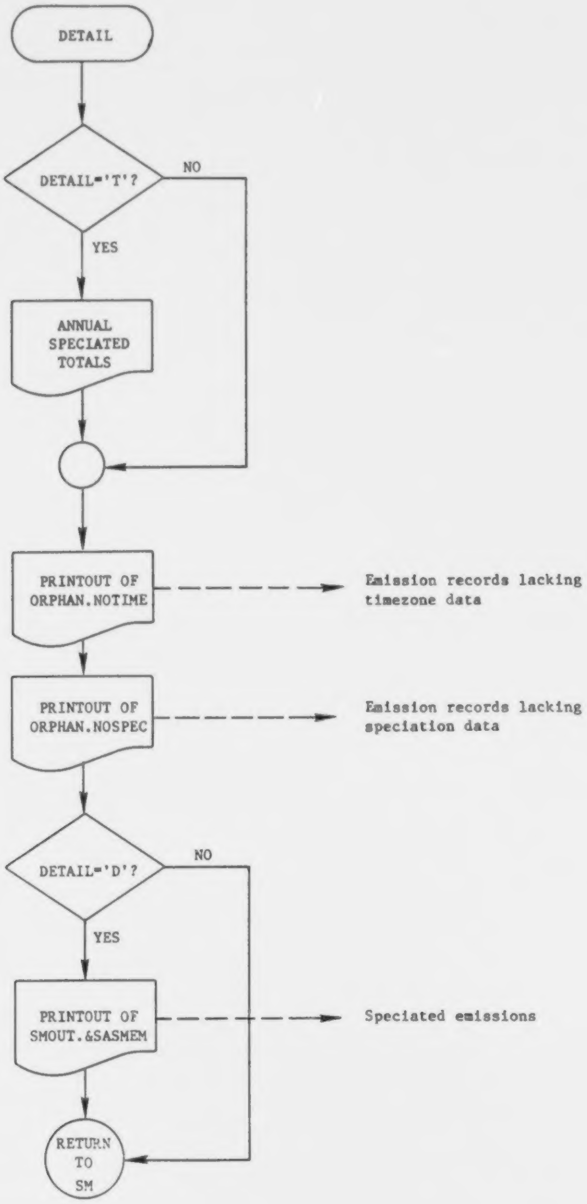
Merge Timezone File with Emission File by state, county.
If Emission File contributes, INA=TRUE



Merge Speciation File (WORK.SPECIES) with Timezone File (WORK.TZFOUT)

If Speciation File contributes, IN2=TRUE.
If Timezone File contributes, IN1=TRUE.


PRINT SPECIES DESCRIPTIONS
ECHO CONTROL OPTIONS FILE
READ FILE
Read SAROAD description file into WORK.SAROAD
SORT BY CLASS
SORT WORK.CLASSES BY CLASS
MERGE
Merge WORK.SAROAD with WORK.CLASSES BY CLASS; only keep records if WORK.CLASSES contributes
SORT BY ORDER
PRINTOUT OF SPECIES DESCRIPTIONS
RETURN TO SM


DETAIL
DETAIL='T'?
NO
YES
ANNUAL SPECIATED TOTALS
PRINTOUT OF ORPHAN.NOTIME
Emission records lacking timezone data
PRINTOUT OF ORPHAN.NOSPEC
Emission records lacking speciation data
DETAIL='D'?
NO
YES
PRINTOUT OF SMOUT.&SASMEM
Speciated emissions
RETURN TO SM

SPATIAL ALLOCATION MODULE

The Spatial Allocation Module (SAM) matches and merges area source emissions with spatial allocation factors enabling the emissions to be assigned to modeling grid cells. For point sources, SAM assigns points to grid cells based on latitude/longitude or UTM coordinates. For NAPAP, SAM uses a latitude and longitude referenced grid system made up of columns and rows originating at the southwestern most corner of the grid increasing north and east. Column and row is calculated from latitude and longitude as follows:

$$\text{Column} = 4(\text{WLON}-\text{Longitude}) +1$$
$$\text{Row} = 6(\text{Latitude}-\text{SLAT}) +1,$$

where WLON = The westernmost longitude of the grid (125 for 1980 NAPAP)

SLAT = The southernmost latitude of the grid (25 for 1980 NAPAP).

The numbers 4 and 6 represent the number of grids per degree longitude and latitude, respectively. Fractional parts of column and row are truncated; the integer portion is the resulting column and row numbers. The 1980 NAPAP grid is illustrated in Figure 3-1. For ease of readability, 80 x 80 km grids are presented in Figure 3-1, therefore, 4 NAPAP grids make up each cell.

Spatial allocation of point sources may also be accomplished using UTM (rectangular) coordinates. If latitude and longitude are missing from a point record, SAM uses UTM location data. For area sources, SAM will spatially allocate emissions to any grid system in which spatial allocation factors are available. The SAM also has the capability of processing a variety of grid cell sizes, the limiting factors being the file size and availability of spatial factors for the specified grid cell size.

SAM has the ability to operate on emissions data from SM, TAM, or directly from MDEM. The primary outputs of the SAM are the emissions files containing calculated column and row numbers for point sources and spatially resolved emissions for area sources. Also output is a diagnostic report which summarizes the action performed by the SAM and any emission records without spatial data. An optional hardcopy listing of the spatial factors is also available. The functional requirements for spatially allocating point and area sources are discussed independently.

Spatial Allocation of Point Sources

The SAM allocates point source emissions to grid cells on the basis of latitude and longitude previously extracted from emissions records by the MDEM. The SAM reads a point source record, calculates the grid cell within which that set of coordinates falls, and adds the grid cell identification (Column, Row) into the emission record. If latitude and/or longitude data are

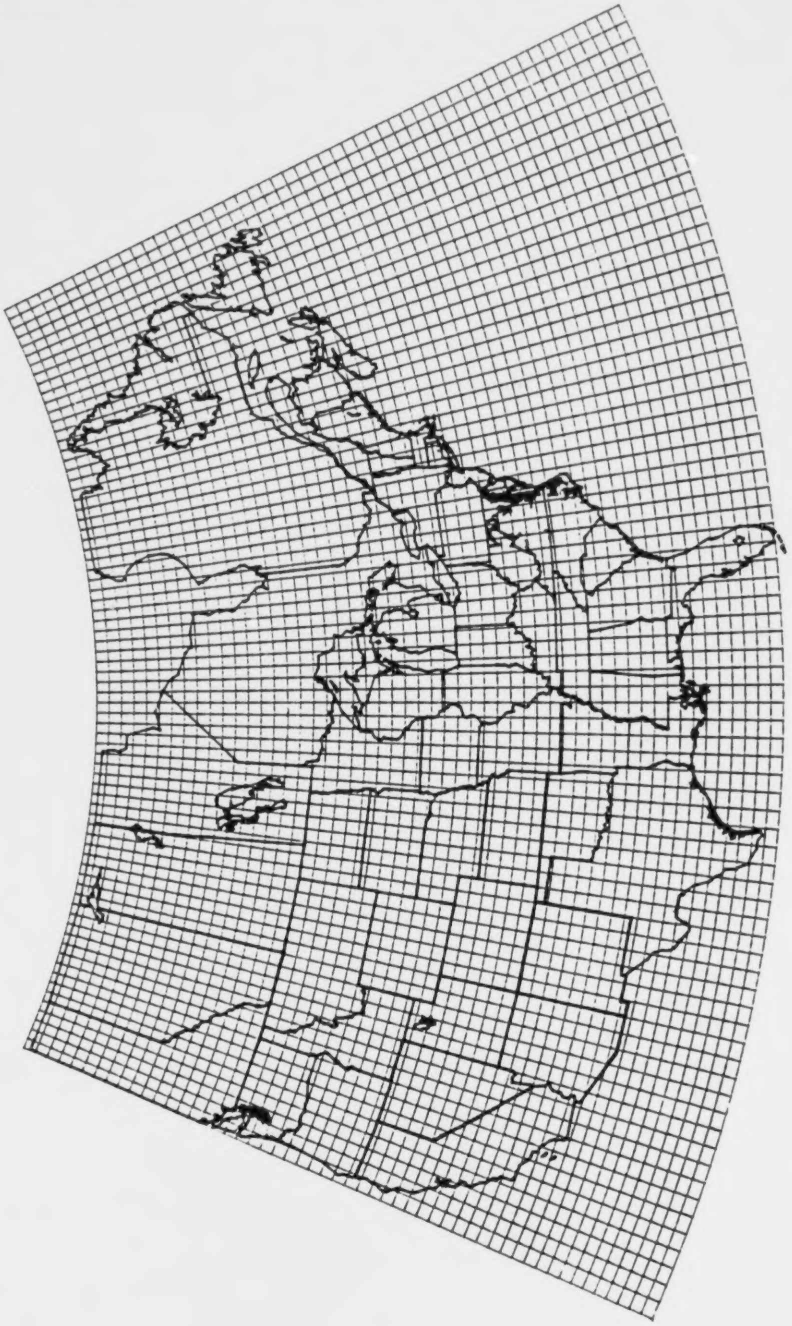


Figure 3-1. The 1980 NAPAP grid system (Note: 80x80 km grid cells are plotted in this figure).

missing or incorrect, the SAM will generate the appropriate values by converting UTM coordinates to latitude and longitude. If UTMs are also missing, the emission record is output to an orphan file and printed with the diagnostic report.

Within SAM, the LOCATE macro spatially assigns point source emissions to grid cells. This routine first merges the Control Options File variables with the emissions file and calculates grid locations for point sources. Locations outside the NAPAP study area are output to an error file and printed in the diagnostic report. Valid grid cells are output with the emissions data. Each point level record also contains a spatial allocation factor of 1 since each point source is assumed to contribute its total emissions to one modeling grid cell.

Spatial Allocation of Area Sources

Spatial allocation of area source data is less straightforward and requires additional input data. Each area source emissions category is reported on a county basis in the area source emissions file(s). Since the subcounty distribution of emissions is not known, emissions have to be allocated from counties to grid cells on the basis of a known distribution, e.g., LANDSAT or census data.

The SAM allocates area source emissions from counties to grid cells in the ALLOCATE macro using the Spatial Allocation Factor File (SAFF). The SAFF provides, for each of up to 30 surrogate indicators for each County/Grid combination, a fractional multiplier representing the portion of the county total of each surrogate which falls within each grid cell. For the 1980 NAPAP inventory, a grid cell represents an area 1/6 degree latitude by 1/4 degree longitude, approximately 20 x 20 kilometers. Spatial allocation factors in SAFF are currently limited to 160 grids per county and up to 30 spatial allocation categories by the peripheral programs which create them (these will be discussed further under "Peripheral Software"). Another file, the Surrogate Selection File (SSF), matches each area source category, referenced by (pseudo) SCC to the most appropriate surrogate indicator. This file is not directly accessed by SAM and is maintained with the peripheral software.

The ALLOCATE macro matches each area source emission record to the appropriate set of allocation factors in the SAFF by merging each county level emissions record for each particular area source category with the appropriate set of surrogate allocation factors. For example, if 50 percent of a county's population resides in a specific grid cell, the population surrogate will indicate that 50 percent of that county's emissions allocated by population originated from that grid cell. The emissions are then multiplied by the spatial allocation factors and output for further processing in FREDS.

Flow Chart and Description

Processing in the SAM is illustrated in the accompanying flow charts. An individual "set" of flow charts is presented each for point and area sources. The first diagram of each set represents the overall module flow. Processes depicted by double vertical lines indicate the presence of several subprocesses, and hence a second level of more detailed diagrams are presented for these. For example, the first double-lined process is "READ CONTROL OPTIONS FILE". Starting on the next page, the reader will find a second-level chart with the same name. On completion of the second level of subprocesses, the user returns to the first level. The user would then continue on the first level until the next double-lined process is encountered - "MACRO LOCATE". Again, the reader refers to a second level diagram. This continues until the reader has encountered all processes depicted on the main module flow chart. If a second level process contains a double-lined process box, this refers to a third level subprocess. The user must return to the second level and, when completed, return to the first level to continue.

SAM options are specified in the Run Identification record of the Control Options File. The SAM reads the first record of the COF and determines whether a point or area source emissions file is to be processed. SAM will stop processing in the event of an error in the COF format or if an incorrect source type is specified for the SAS code being executed. SAM then reads the Grid Identification record for both point and area sources and calculates the number of columns, rows, and grid cells based on the latitude and longitude of grid boundaries supplied in the COF.

For point sources, the LOCATE macro determines the grid cell to which emissions are assigned. Spatial allocation proceeds by first checking a source record for valid latitude and longitude data and calculating grid row and column. If latitude and longitude are either absent or invalid, the record is checked for valid UTM coordinates and the grid position is then calculated using UTM coordinates. If the UTM coordinates are also missing or invalid, the emission record cannot be spatially allocated and is output to an error file. SAM also checks for grid cells outside the specified boundaries and outputs these to an error file. The spatially resolved point source emissions file is output for further processing by FREDS.

For area sources, two additional control records are read. The Subfile Definition record reads in and checks the number of records to be processed by SAM. If the number of records to be processed exceeds 1,000,000, execution ceases and an error message is output. The Pollutant Variable List record reassigns variable names to spatially allocated emissions. Once the COF has been read, the spatial factors are read and processed into a SAS data set by the ALLOCATE macro. The Spatial Allocation Factor file consists of one Spatial Allocation record for each SCC, State, County, Column, and Row. The correct factor is assigned to an area source category in the Spatial Allocation Factor Preprocessor (SAFP). SAFP matches spatial factors to area source categories using a Surrogate Selection File (SSF) which contains the appropriate spatial factor category (population, land use, etc.) for each SCC. The SAFF is then merged with the area source emissions file in the macro ALLOCATE by EISSCC, State, and County. The merged records are evaluated as follows.

If a record contains data from both the emissions and SAFF files, it is a valid, spatial record and is merged with the emissions file. If a record contains only data from the SAFF, it is output to an "orphaned" spatial allocation factor file. Since the spatially allocated emissions file can contain more than one grid cell for each SCC/County record, SAM creates one record for each grid cell within a SCC/County record. The emissions are then multiplied by the spatial allocation factors and output.

For both point and area source files, the diagnostic report has at least two levels of detail: summary and detailed. The summary report includes processing messages, record counts for all files, and a listing of the orphan and error files. A hardcopy listing of the spatial allocation factors may also be requested by specifying "D" for the diagnostic report option. For area source files, emissions totals may also be requested by specifying "T" for the diagnostic report option.

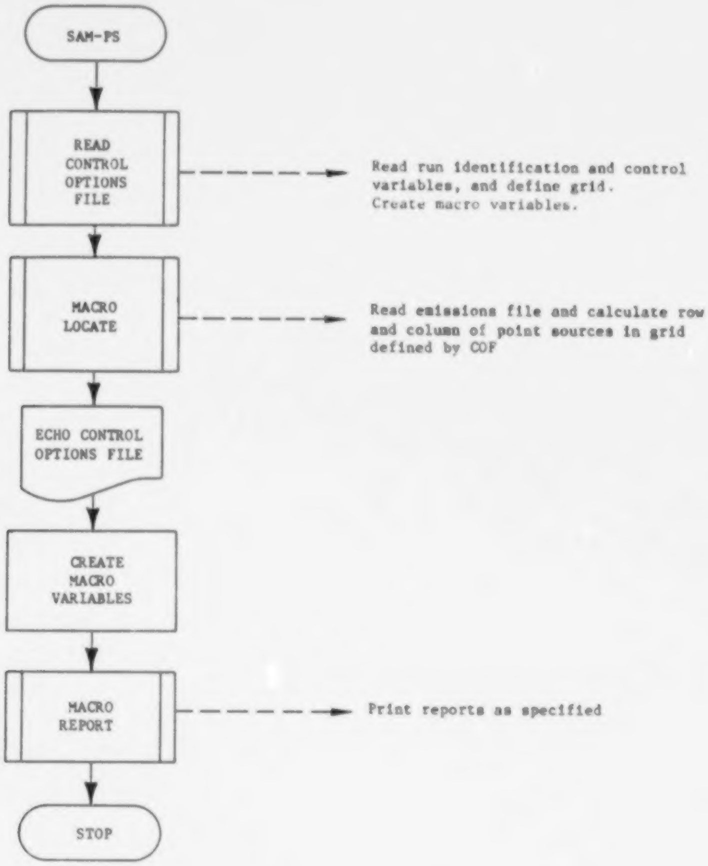
Peripheral Software

A collection of peripheral software used to generate the spatial allocation factors was previously developed by Alliance and ASRL and currently exists in several locations. A brief historical perspective of the development of the spatial allocation factors is given below.

Spatial allocation factor development for the 1980 NAPAP Emissions Inventory began by evaluating LANDSAT land use data and 1980 census data. The LANDSAT data provides land use percentages for 20 x 20 km grid cells for 10 land use categories. Two additional categories, composite forest and total land, were calculated by Alliance for a total of 12 land use categories. Composite forest is the sum of coniferous, deciduous and mixed forest land for a grid cell. The twelfth category, total land, represents the fraction of a county's total land contained within each grid cell. The 1980 census data supplies population and housing data on a subcounty basis. The 14 spatial surrogates are as follows: population, housing, urban land, agricultural land, rangeland, deciduous forest land, coniferous forest land, mixed forest land (including forested wetlands), composite forest, water, barren land, nonforested wetland, mixed agricultural land and rangeland, and total land. In developing spatial factors for area source emissions, the pollutant in question governed which land use determinant was used. For example, the spatial allocation of ammonia emissions from manure field application uses the LANDSAT agricultural land area as a surrogate while the census housing data may be used to determine the number of oil and gas burning dwellings for SO_x emissions. Fractions for each grid cell were based on county to grid area fractions and the fractional land use in each grid cell. The LANDSAT and census data were processed separately and later merged for input to the Spatial Allocation Factor Preprocessor (SAFP) program. A Surrogate Selection File was also created for input to SAFP such that spatial categories may be matched to corresponding EISSCC codes.

The Spatial Allocation Factor Preprocessor reads a Control Options File, Surrogate Selection File (SSF), and the spatial allocation factors derived from the LANDSAT and census data. The spatial allocation factors (SAFs) are matched to a surrogate category and summed by county. If the SAF total for a given county is equal to zero, a default surrogate, defined in the control file, is used to define the spatial factor. If the sum of the factors is less than 9,995 or greater than 10,005 (corresponding to 95 and 105 percent coverage of the county area), the spatial factors are normalized. The spatial allocation factors are reformatted for compatibility with emissions records and output to the Spatial Allocation Factor File (SAFF) for input to SAM. SAFP has two restrictions when calculating spatial allocation factors: the number of grid cells per county is limited to 160 and the number of spatial allocation categories specified may not exceed 30.

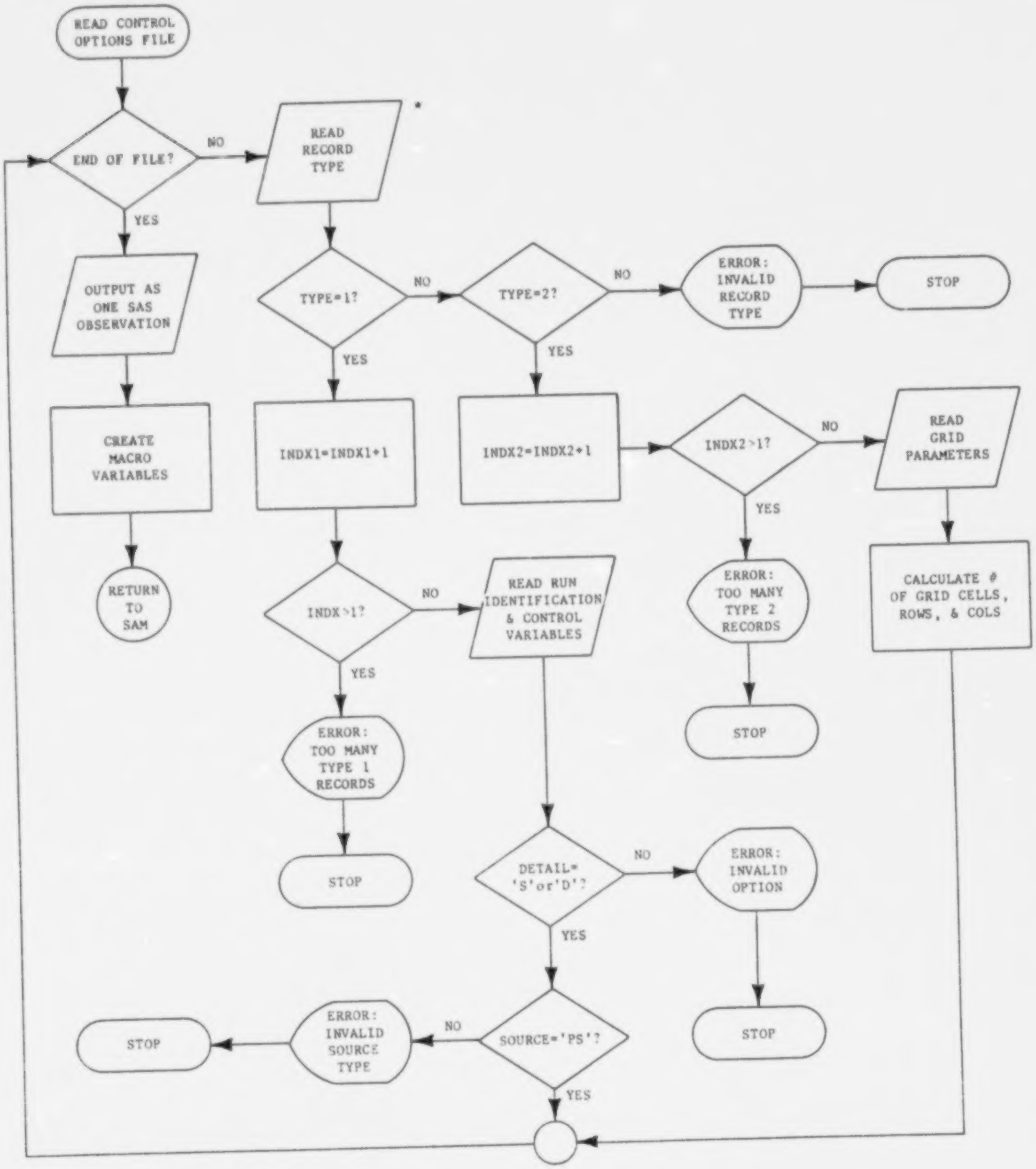
Spatial Allocation Module: Point Sources--



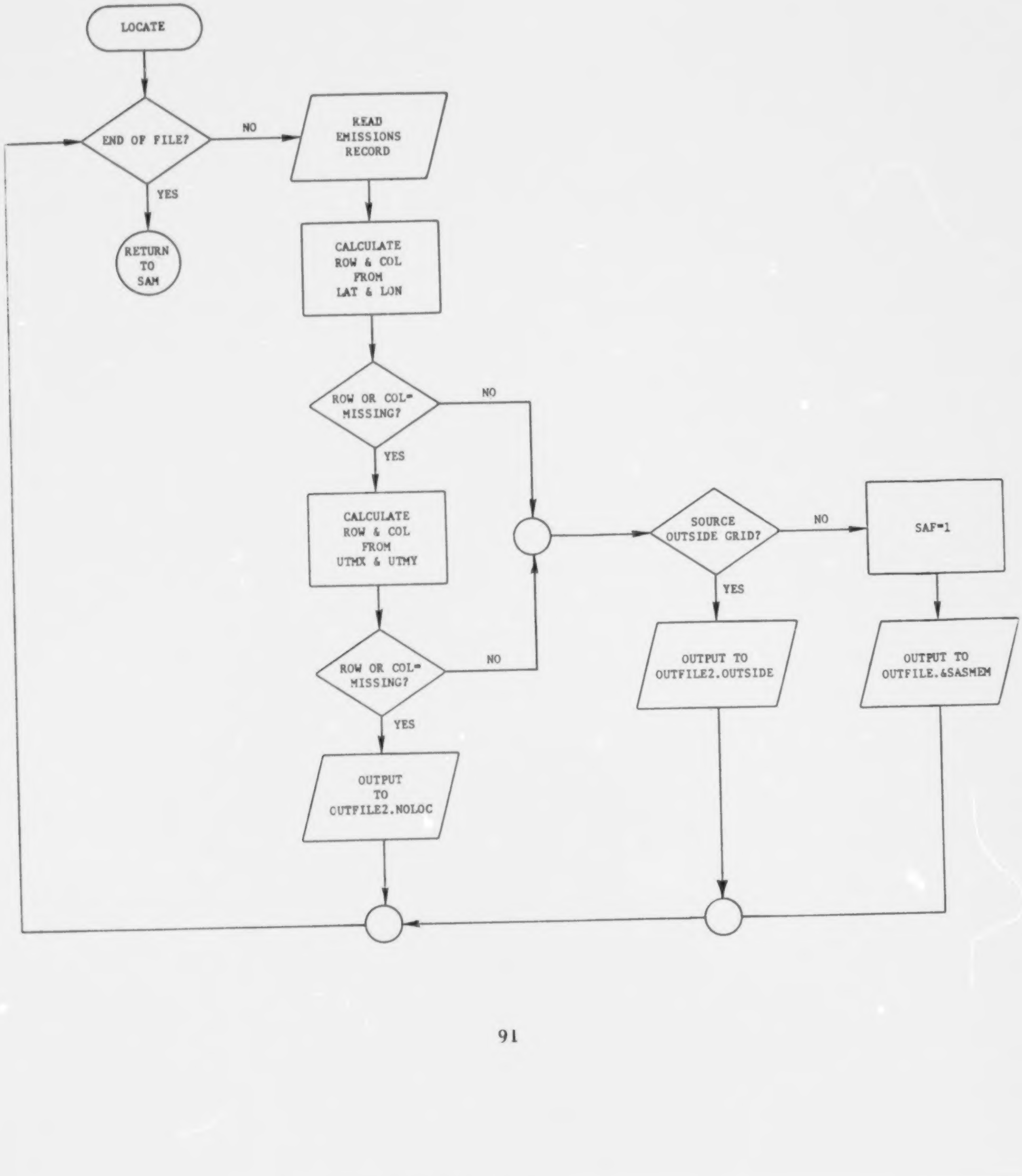
Read run identification and control variables, and define grid.
Create macro variables.

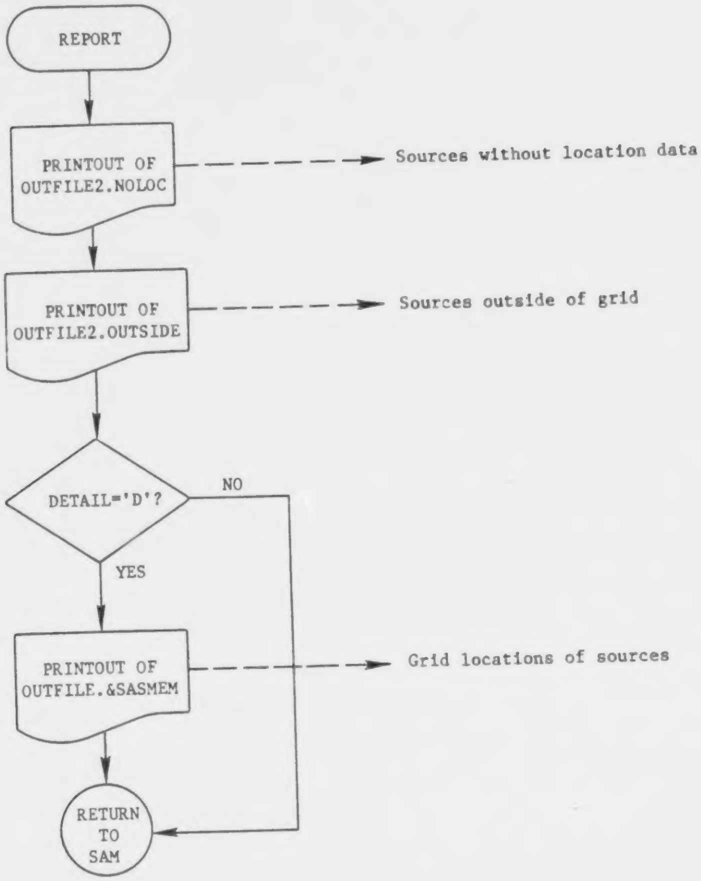
Read emissions file and calculate row and column of point sources in grid defined by COF

Print reports as specified

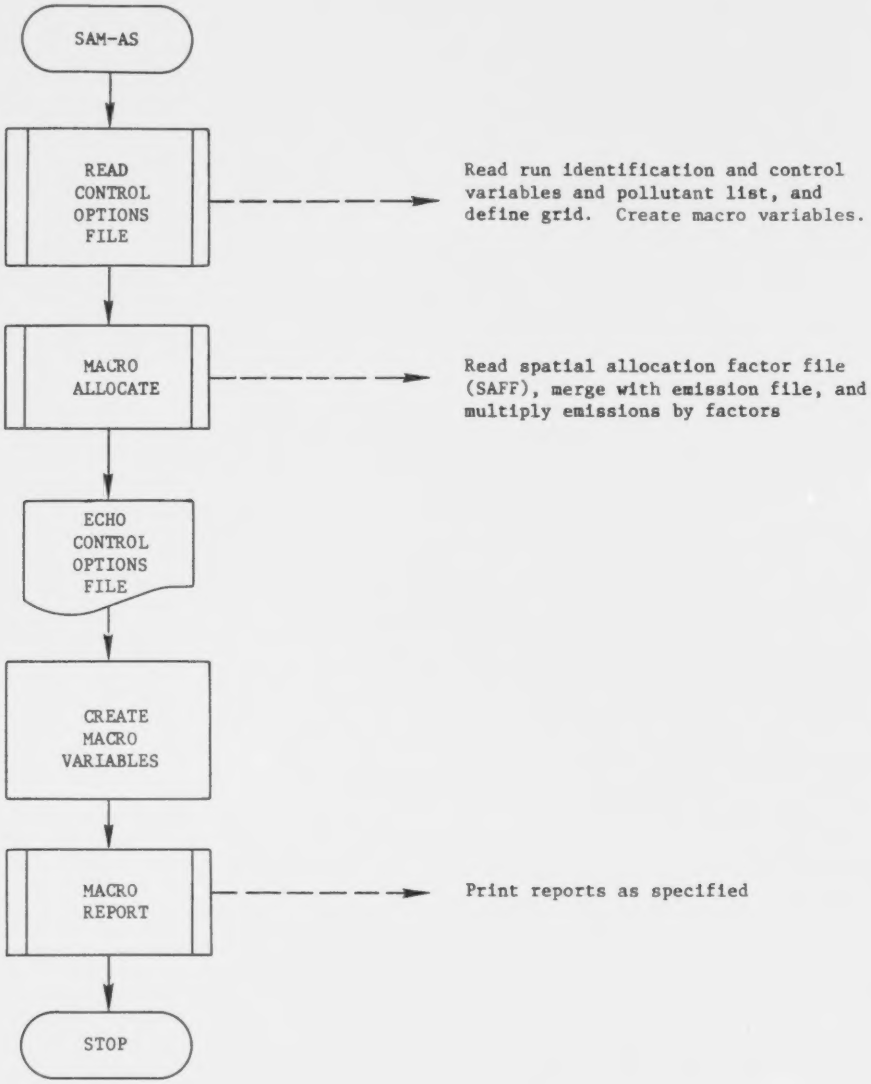

READ CONTROL OPTIONS FILE
END OF FILE?
NO
YES
READ RECORD TYPE
*
OUTPUT AS ONE SAS OBSERVATION
CREATE MACRO VARIABLES
RETURN TO SAM
TYPE=1?
NO
YES
TYPE=2?
NO
YES
ERROR: INVALID RECORD TYPE
STOP
INDX1=INDX1+1
INDX2=INDX2+1
INDX2>1?
NO
YES
READ GRID PARAMETERS
CALCULATE # OF GRID CELLS, ROWS, & COLS
INDX>1?
NO
YES
READ RUN IDENTIFICATION & CONTROL VARIABLES
ERROR: TOO MANY TYPE 2 RECORDS
STOP
ERROR: TOO MANY TYPE 1 RECORDS
STOP
DETAIL='S'or'D'?
NO
YES
ERROR: INVALID OPTION
STOP
SOURCE='PS'?
NO
YES
ERROR: INVALID SOURCE TYPE
STOP

*DO NOT ADVANCE RECORD POINTER


LOCATE
END OF FILE?
NO
YES
RETURN TO SAM
READ EMISSIONS RECORD
CALCULATE ROW & COL FROM LAT & LON
ROW OR COL= MISSING?
NO
YES
CALCULATE ROW & COL FROM UTMX & UTMY
ROW OR COL= MISSING?
NO
YES
OUTPUT TO OUTFILE2.NOLOC
SOURCE OUTSIDE GRID?
NO
YES
SAF=1
OUTPUT TO OUTFILE2.OUTSIDE
OUTPUT TO OUTFILE.&SASMEM


REPORT
PRINTOUT OF OUTFILE2.NOLOC
Sources without location data
PRINTOUT OF OUTFILE2.OUTSIDE
Sources outside of grid
DETAIL='D'?
NO
YES
PRINTOUT OF OUTFILE.&SASMEM
Grid locations of sources
RETURN TO SAM

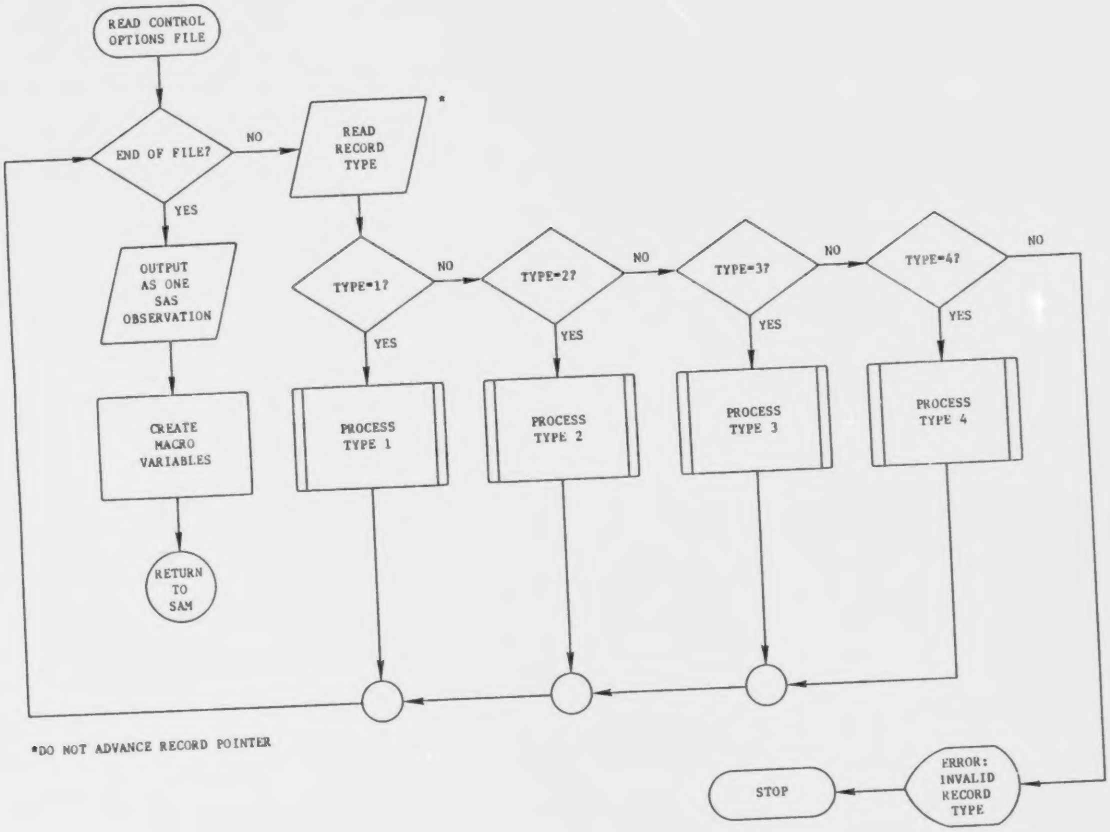
Spatial Allocation Module: Area Sources--



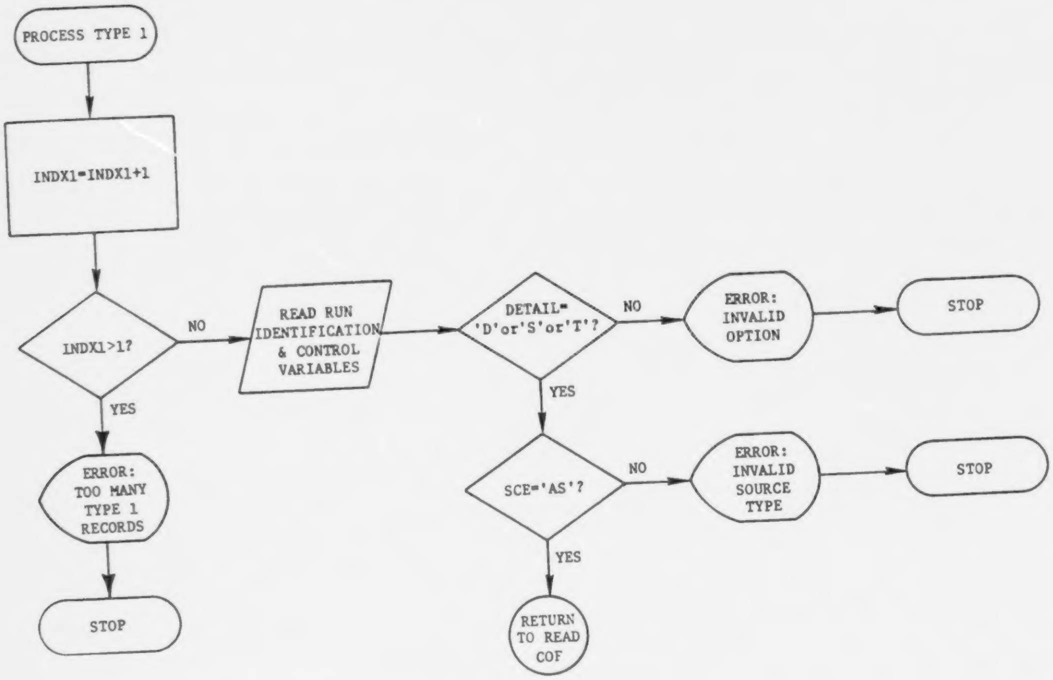
Read run identification and control variables and pollutant list, and define grid. Create macro variables.

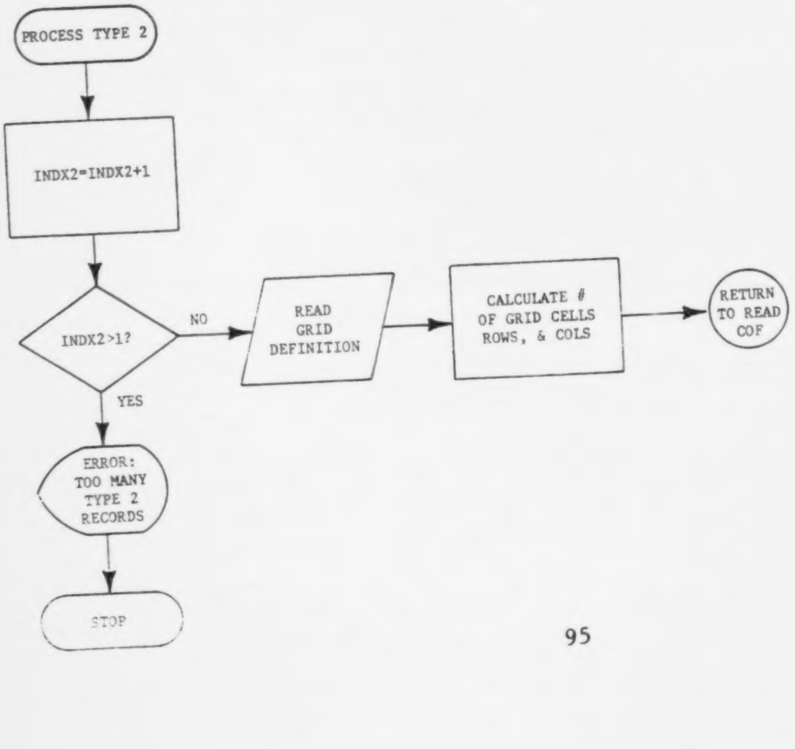
Read spatial allocation factor file (SAFF), merge with emission file, and multiply emissions by factors

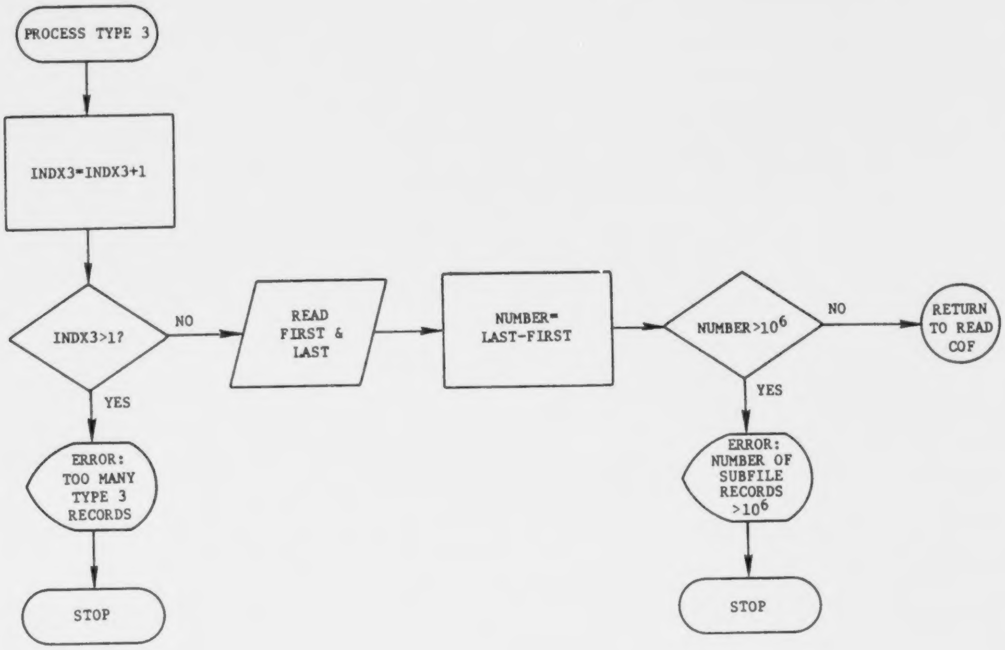
Print reports as specified

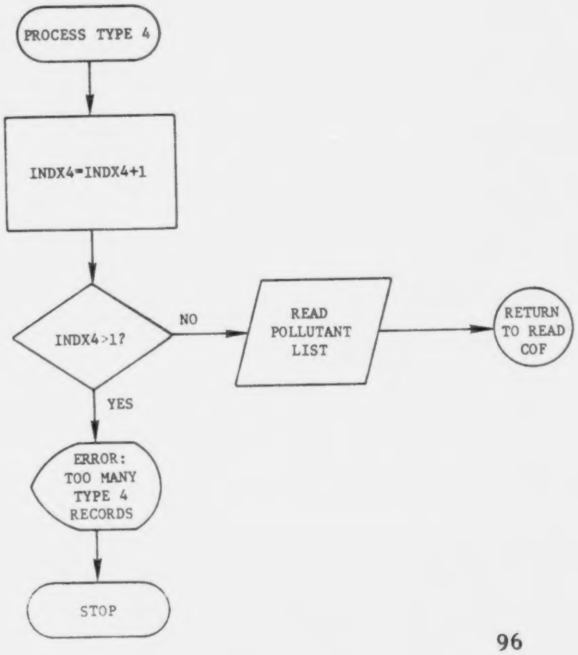


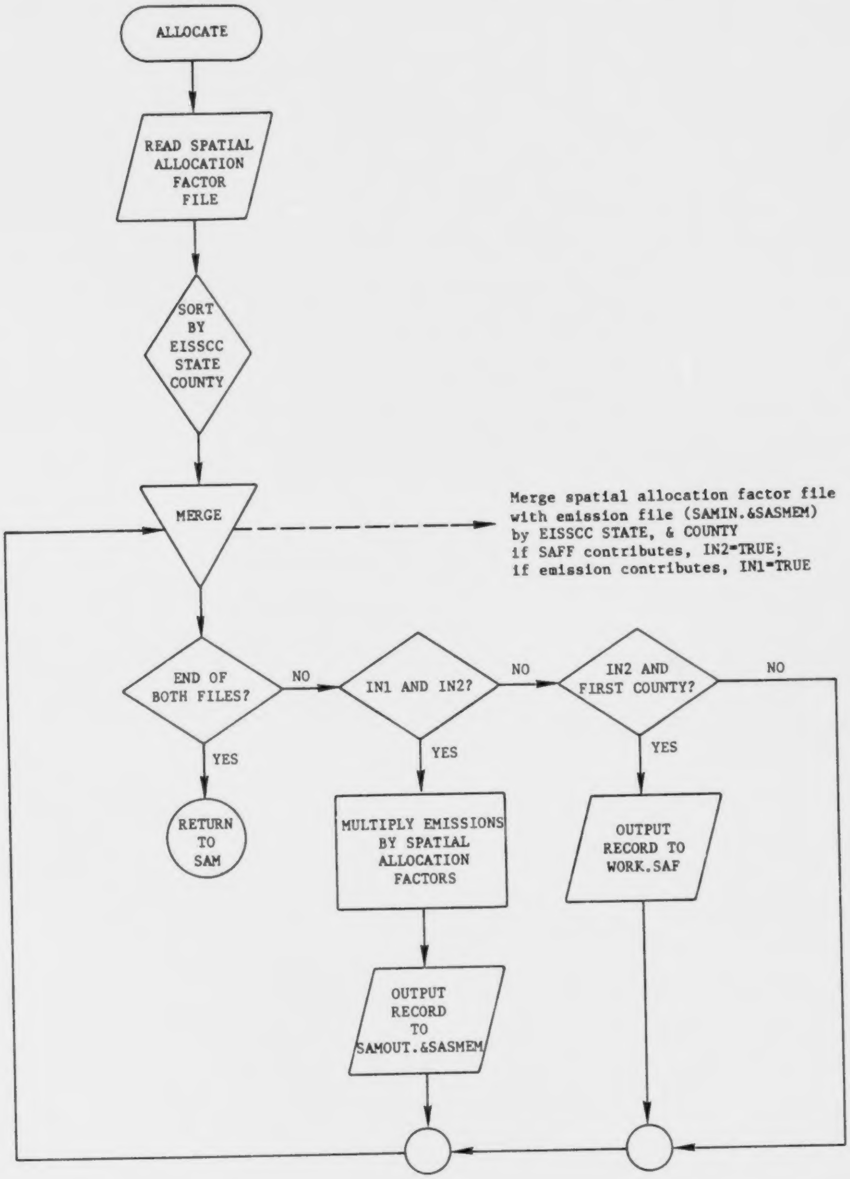
*DO NOT ADVANCE RECORD POINTER


PROCESS TYPE 1
INDX1=INDX1+1
INDX1>1?
NO
YES
READ RUN IDENTIFICATION & CONTROL VARIABLES
DETAIL= 'D'or'S'or'T'?
NO
ERROR: INVALID OPTION
STOP
YES
SCE='AS'?
NO
ERROR: INVALID SOURCE TYPE
STOP
YES
RETURN TO READ COF
ERROR: TOO MANY TYPE 1 RECORDS
STOP

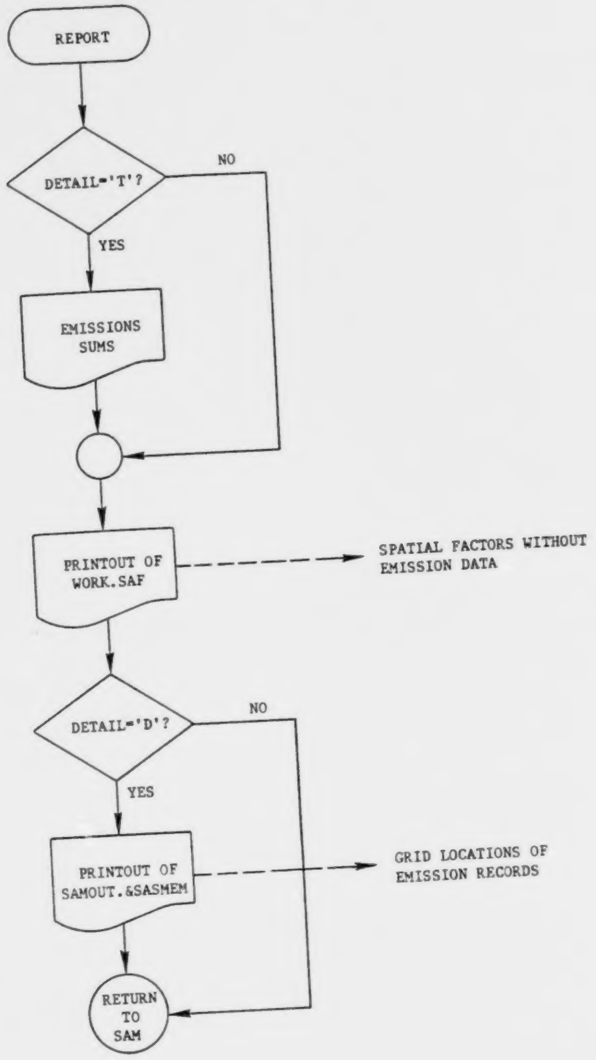

PROCESS TYPE 2
INDX2=INDX2+1
INDX2>1?
NO
READ GRID DEFINITION
CALCULATE # OF GRID CELLS ROWS, & COLS
RETURN TO READ COF
YES
ERROR: TOO MANY TYPE 2 RECORDS
STOP


PROCESS TYPE 3
INDX3=INDX3+1
INDX3>1?
NO
YES
ERROR: TOO MANY TYPE 3 RECORDS
STOP
READ FIRST & LAST
NUMBER= LAST-FIRST
NUMBER>10^6
NO
RETURN TO READ COF
YES
ERROR: NUMBER OF SUBFILE RECORDS >10^6
STOP


PROCESS TYPE 4
INDX4=INDX4+1
INDX4>1?
NO
READ POLLUTANT LIST
RETURN TO READ COF
YES
ERROR: TOO MANY TYPE 4 RECORDS
STOP


ALLOCATE
READ SPATIAL ALLOCATION FACTOR FILE
SORT BY EISSCC STATE COUNTY
MERGE
END OF BOTH FILES?
NO
YES
RETURN TO SAM
IN1 AND IN2?
NO
YES
MULTIPLY EMISSIONS BY SPATIAL ALLOCATION FACTORS
OUTPUT RECORD TO SAMOUT.&SASMEM
IN2 AND FIRST COUNTY?
NO
YES
OUTPUT RECORD TO WORK.SAF

Merge spatial allocation factor file
with emission file (SAMIN.&SASMEM)
by EISSCC STATE, & COUNTY
if SAFF contributes, IN2=TRUE;
if emission contributes, IN1=TRUE


REPORT
DETAIL='T'?
NO
YES
EMISSIONS SUMS
PRINTOUT OF WORK.SAF
SPATIAL FACTORS WITHOUT EMISSION DATA
DETAIL='D'?
NO
YES
PRINTOUT OF SAMOUT.&SASMEM
GRID LOCATIONS OF EMISSION RECORDS
RETURN TO SAM

MODEL INPUT PREPROCESSOR

The Model Input Preprocessor (MIP) accepts either (1) the point source emissions files and subfiles into which the appropriate temporal, species, and/or spatial factors have been merged, or (2) the fully resolved area source files or subfiles. The MIP concatenates the point or area source (sub)files to arrive at a complete SAS formatted point or area source Modeler's Tape. Area source data are further sorted by GMT, and hourly totals for each subspecies are tabulated and printed in the diagnostic report. For point sources, the data are sorted by Column and Row and are then output. For area sources, the control file variable, EMRES, allows this user to specify whether the output data set is to be sorted by Column and Row or by EISSCC, State, and County.

The main program consists of SAS macro routines. The CHOOSE macro controls the program execution and calls the POINT, COMBINE or DETAIL macros based on user supplied information in the Control Options File.

A diagnostic report containing SAS summary statistics documenting the actions of the MIP accompanies the Modeler's Tape. An optional listing of hourly totals for area sources is also available by specifying "T" for the detail option. The totals option also outputs area source emission records to a backup tape.

The SAS formatted Modeler's Tapes may be converted to EBCDIC characters as an additional job step to the MIP JCL or as a separate program. The program listing is supplied in Appendix E with the MIP source code. For point sources, the Control Options File reads in the inventory version number (5.2 or 5.3) which indirectly allows the user to specify the number of subspecies (37 for 5.2; 17 for 5.3). Based on the user specified version number, the SAS-EBCDIC program sets the appropriate arrays. The SAS-EBCDIC conversion for area sources requires specification of the total number of pollutants and the level of resolution of the emissions (e.g., gridded versus nongridded).

Resolution of the point users Modeler's Tapes into speciated, hourly, gridded emissions requires multiplication of annual emissions by their respective factors. Sample SAS programs to resolve Versions 5.2 and 5.3 point source emissions are presented in Figures 3-2 and 3-3.

Flow Chart and Description

The Model Input Preprocessor (MIP) can merge a number of point or area source emissions files or subfiles. The user, however, should be aware of necessary space requirements before attempting to combine a large number of subfiles. The flow chart for this module is found at the end of this section. The first diagram represents the overall module flow, and where

```
OPTIONS MPRINT;
*;
***** IMPS52 WILL PRODUCE GRIDDED, ALLOCATED EMISSIONS FOR 5.2
      POINT SOURCE FILES SUITABLE FCR A MODELER'S TAPE;
*;
***** TO EXECUTE PROVIDE THE NUMBER OF THE TEMPORAL SCENARIO
      TO BE ALLOCATED(1-12) AND A DAYLITE SAVINGS INDICATOR
      (Y FOR YES, N FOR NO) TO THE MACRO %DOIT.;
*;
***** THE OUTPUT FILE CONTAINS THE GRID COLUMN AND ROW (COL,ROW),
      THE GMT HOUR (GMT) AND THE FULLY RESOLVED EMISSIONS (GPOLL1-
      GPOLL47) IN TONS/HOUR FOR ALL POLLUTANTS EXCEPT THE 29 THC
      SPECIES WHICH HAVE UNITS OF GM-MOLES/HOUR.;
*;
%MACRO DOIT(TAFNO,DST);
%*;
%*---- CALCULATE POSITION OF HOURLY FRACTIONS TO BE APPLIED;
%*;
%LET A=%EVAL((&TAFNO-1)*24+1);
%LET B=%EVAL(&A+23);
*;
*---- OPEN DATASETS AND DEFINE SAS ARRAYS;
*;
DATA OUTFILE.DATA(KEEP=COL ROW GMT GPOLL1-GPOLL47);
SET INFILE.DATA;
ARRAY SAROAD(K) SAROAD1-SAROAD15;
ARRAY EMISS(K) EMISS1-EMISS15;
ARRAY SF SF1-SF37;
ARRAY POLL(N) POLL1-POLL47;
ARRAY GPOLL(N) GPOLL1-GPOLL47;
ARRAY HOUR HOUR&A-HOUR&B;
ARRAY GHOUR(A) GHOUR1-GHOUR24;
*;
*---- EXTRACT EIS POLLUTANTS AND SPECIATE;
*;
  DO K=1 TO NUMPOLL;
    SELECT (SAROAD);
      WHEN (42401) POLL1=EMISS /* SO2 */;
      WHEN (12403) POLL2=EMISS /* SO4 */;
      WHEN (11101) DO;
        POLL3=EMISS /* TSP */;
        DO _I_=33 TO 37;
          N=_I_+10;
          POLL=POLL3*SF /* ALKALINE DUST SPECIES */;
        END;
      END;
      WHEN (12128) POLL4=EMISS /* PB */;
      WHEN (42101) POLL5=EMISS /* CO */;
      WHEN (42302) POLL6=EMISS /* HCL */;
      WHEN (42303) POLL7=EMISS /* HF */;
      WHEN (42602) DO;
        POLL8=EMISS /* NOX */;
        POLL41=POLL8*SF31 /* NO */;
        POLL42=POLL8*SF32 /* NO2 */;
      END;
      WHEN (42604) POLL9=EMISS /* NH3 */;
      WHEN (43104) POLL10=EMISS /* VOC */;
      WHEN (43101) DO;
        POLL11=EMISS /* TOT HC */;
        DO _I_=1 TO 29;
```

Figure 3-2. Sample SAS program for resolving point source emissions (Version 5.2).

```
          N=_I_+11;
          POLL=POLL11*SF*100*907.2 /* 29 THC SPECIES(GM-MOLE PER YR) */;
        END;
      END;
      OTHERWISE;
    END;
END;
*;
*---- CHECK FOR DAYLIGHT SAVINGS TIME;
*;
%IF &DST=Y %THEN %DO;
  ZONE=ZONE-DAYLITE;
%END;
*;
*---- OFFSET TO GMT;
*;
DO _I_=1 TO 24;
  A=ZONE+_I_;
  IF A>24 THEN A=A-24;
  GHOUR=HOUR*SEA&TAFNO*DAY&TAFNO;
END;
*;
*----- ALLOCATE TEMPORALLY AND OUTPUT 1 OBSERVATION PER HOUR;
*;
DO A=1 TO 24;
  GMT=A;
  DO N=1 TO 47;
    GPOLL=POLL*GHOUR;
    END;
  OUTPUT;
END;
%MEND DOIT;
*;
*----- INVOKE THE MACRO;
*;
%DOIT(1,N);
```

Figure 3-2 (continued)

```
OPTIONS MPRINT;
*;
***** IMPS53 WILL PRODUCE GRIDDED, ALLOCATED EMISSIONS FOR 5.3
      POINT SOURCE FILES SUITABLE FOR A MODELER'S TAPE;
*;
***** TO EXECUTE PROVIDE THE NUMBER OF THE TEMPORAL SCENARIO
      TO BE ALLOCATED(1-12) AND A DAYLITE SAVINGS INDICATOR
      (Y FOR YES, N FOR NO) TO THE MACRO %DOIT.;
*;
***** THE OUTPUT FILE CONTAINS THE GRID COLUMN AND ROW (COL,ROW),
      THE GMT HOUR (GMT) AND THE FULLY RESOLVED EMISSIONS (GPOLL1-
      GPOLL28) IN TONS/HOUR FOR ALL POLLUTANTS EXCEPT THE 29 THC
      SPECIES WHICH HAVE UNITS OF GM-MOLES/HOUR.;
*;
%MACRO DOIT(TAFNO,DST);
%*;
%*---- CALCULATE POSITION OF HOURLY FRACTIONS TO BE APPLIED;
%*;
%LET A=%EVAL((&TAFNO-1)*24+1);
%LET B=%EVAL(&A+23);
*;
*---- OPEN DATASETS AND DEFINE SAS ARRAYS;
*;
DATA OUTFILE.DATA(KEEP=COL ROW GMT GPOLL1-GPOLL28);
SET INFILE.DATA;
ARRAY SAROAD(K) SAROAD1-SAROAD15;
ARRAY EMISS(K) EMISS1-EMISS15;
ARRAY SF SF1-SF17;
ARRAY POLL(N) POLL1-POLL28;
ARRAY GPOLL(N) GPOLL1-GPOLL28;
ARRAY HOUR HOUR&A-HOUR&B;
ARRAY GHOUR(A) GHOUR1-GHOUR24;
*;
*---- EXTRACT EIS POLLUTANTS AND SPECIATE;
*;
  DO K=1 TO NUMPOLL;
    SELECT (SAROAD);
      WHEN (42401) POLL1=EMISS /* SO2 */;
      WHEN (12403) POLL2=EMISS /* SO4 */;
      WHEN (11101) DO;
        POLL3=EMISS /* TSP */,
        DO _I_=13 TO 17;
          N=_I_+11;
          POLL=POLL3*SF /* ALKALINE DUST SPECIES */;
        END;
      END;
      WHEN (12128) POLL4=EMISS /* PB */;
      WHEN (42101) POLL5=EMISS /* CO */;
      WHEN (42302) POLL6=EMISS /* HCL */;
      WHEN (42303) POLL7=EMISS /* HF */;
      WHEN (42602) DO;
        POLL8=EMISS /* NOX */;
        POLL22=POLL8*SF11 /* NO */;
        POLL23=POLL8*SF12 /* NO2 */;
      END;
      WHEN (42604) POLL9=EMISS /* NH3 */;
      WHEN (43104) POLL10=EMISS /* VOC */;
      WHEN (43101) DO;
        POLL11=EMISS /* TOT HC */;
        DO _I_=1 TO 10;
```

Figure 3-3. Sample SAS program for resolving point source emissions (Version 5.3)

```
          N=_I_+11;
          POLL=POLL11*SF*907.2 /* 10 THC SPECIES(GM-MOLE PER YR) */;
        END;
      END;
      OTHERWISE;
    END;
END;
*;
*---- CHECK FOR DAYLIGHT SAVINGS TIME;
*;
%IF &DST=Y %THEN %DO;
  ZONE=ZONE-DAYLITE;
%END;
*;
*---- OFFSET TO GMT;
*;
DO _I_=1 TO 24;
  A=ZONE+_I_;
  IF A>24 THEN A=A-24;
  GHOUR=HOUR*SEA&TAFNO*DAY&TAFNO;
END;
*;
*----- ALLOCATE TEMPORALLY AND OUTPUT 1 OBSERVATION PER HOUR;
*;
DO A=1 TO 24;
  GMT=A;
  DO N=1 TO 28;
    GPOLL=POLL*GHOUR;
    END;
  OUTPUT;
END;
%MEND DOIT;
*;
*----- INVOKE THE MACRO;
*;
%DOIT(1,N);
```

Figure 3-3 (continued)

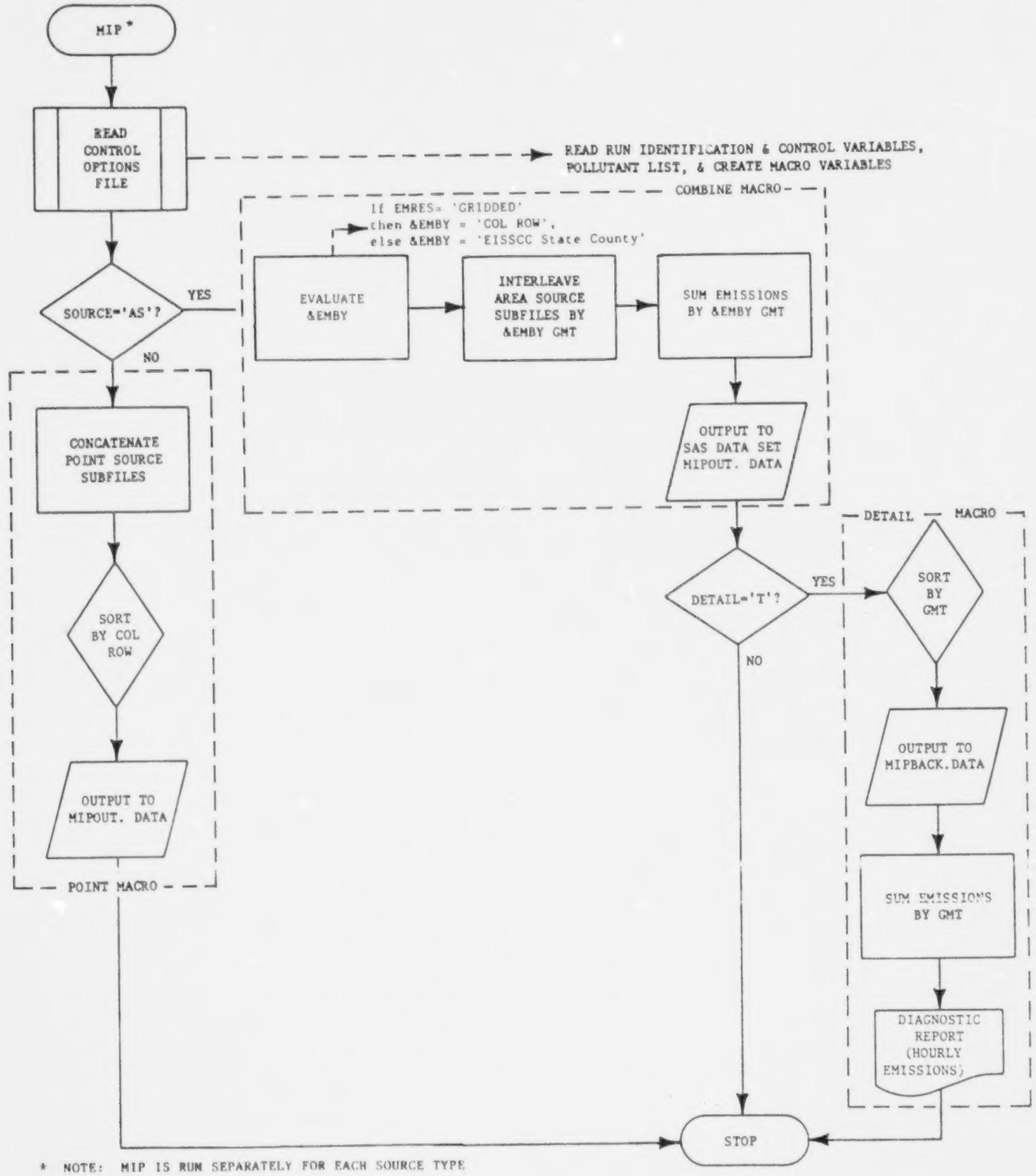
space permits, processes within the various subroutines. Processes depicted by double vertical lines indicate the presence of one or more subprocesses, and hence a second level chart is presented. For MIP, the only double-lined process is "READ CONTROL OPTIONS FILE". On the next page, the reader will find a second level chart with the same name. On completion of the second level chart, the reader returns to the first, and continues on the first level as denoted by the flow arrows. A flowchart for the SAS-EBCDIC conversion will not be presented here.

The first action of the MIP is to read the Control Options File (COF), validate the input, and output it as a single SAS observation. The data from the COF is used by a SAS macro, CHOOSE, to construct the proper SAS command line to merge the specified files. CHOOSE, in turn, invokes the COMBINE, POINT, or DETAIL macros, based on the source type and detail option selected.

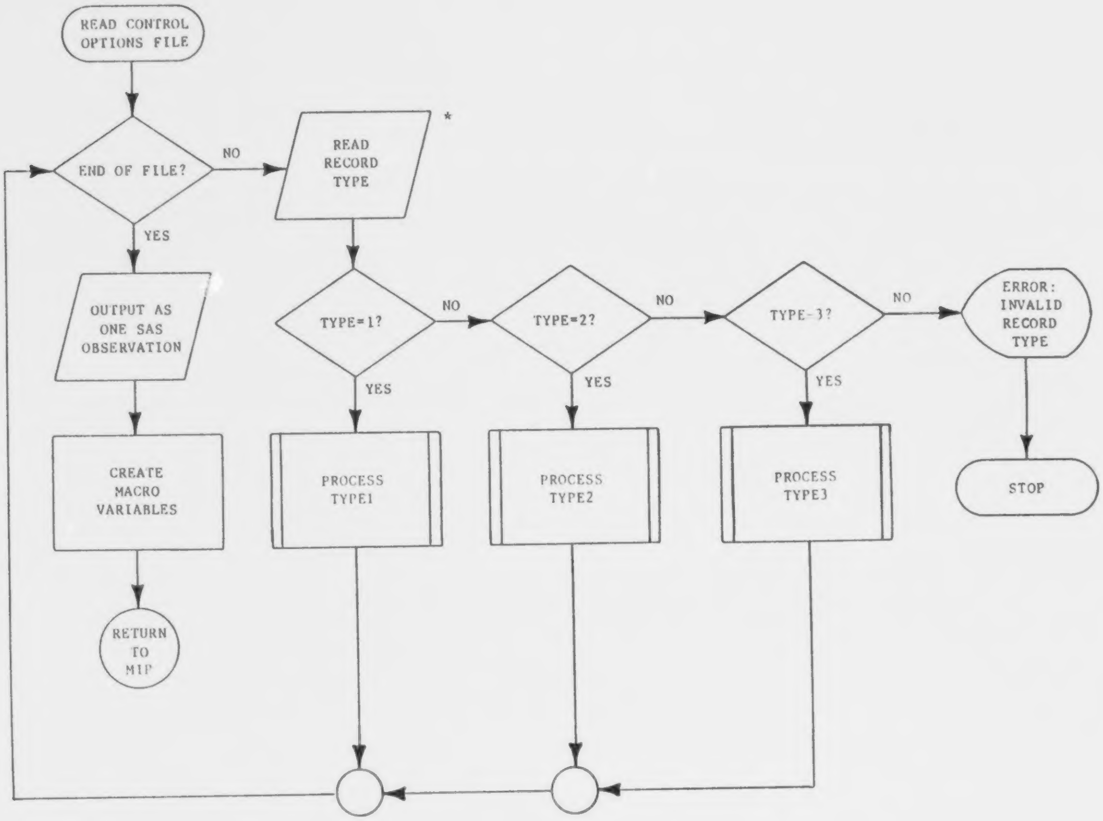
The COMBINE macro combines area source files or subfiles and sums by Column, Row, and GMT or by EISSCC, State, County, and GMT, depending on the option (gridded or nongridded) specified in the COF. The POINT macro concatenates emissions point source files and sorts by column and row. The combined files are output in SAS format to be used for model input. SAS format may be converted to EBCDIC or ASCII characters to accommodate model input data requirements.

Once the files have been successfully combined, the DETAIL macro is called to calculate area source hourly totals if specified by the diagnostic report option. For point and area sources, the summary option provides the SAS job log.

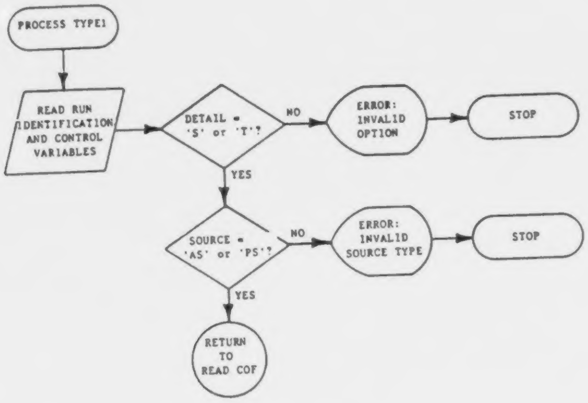
Model Input Preprocessor--

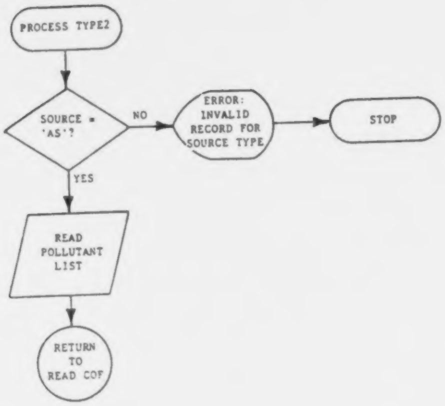

MIP *
READ CONTROL OPTIONS FILE
READ RUN IDENTIFICATION & CONTROL VARIABLES, POLLUTANT LIST, & CREATE MACRO VARIABLES
COMBINE MACRO
If EMRES= 'GRIDDED' then &EMBY = 'COL ROW', else &EMBY = 'EISSCC State County'
SOURCE='AS'?
YES
NO
EVALUATE &EMBY
INTERLEAVE AREA SOURCE SUBFILES BY &EMBY GMT
SUM EMISSIONS BY &EMBY GMT
OUTPUT TO SAS DATA SET MIPOUT. DATA
CONCATENATE POINT SOURCE SUBFILES
SORT BY COL ROW
OUTPUT TO MIPOUT. DATA
POINT MACRO
DETAIL='T'?
YES
NO
DETAIL MACRO
SORT BY GMT
OUTPUT TO MIPBACK.DATA
SUM EMISSIONS BY GMT
DIAGNOSTIC REPORT (HOURLY EMISSIONS)
STOP

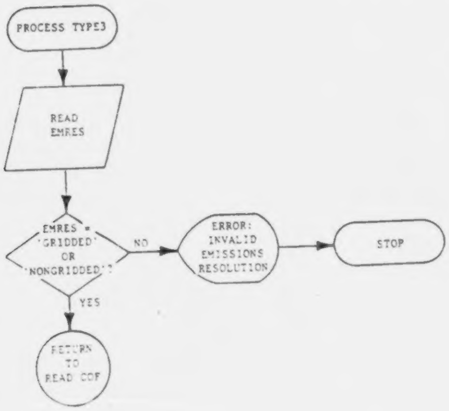
* NOTE: MIP IS RUN SEPARATELY FOR EACH SOURCE TYPE



*DO NOT ADVANCE RECORD POINTER


PROCESS TYPE1
READ RUN IDENTIFICATION AND CONTROL VARIABLES
DETAIL = 'S' or 'T'?
NO
ERROR: INVALID OPTION
STOP
YES
SOURCE = 'AS' or 'PS'?
NO
ERROR: INVALID SOURCE TYPE
STOP
YES
RETURN TO READ COF


PROCESS TYPE2
SOURCE = 'AS'?
NO
ERROR: INVALID RECORD FOR SOURCE TYPE
STOP
YES
READ POLLUTANT LIST
RETURN TO READ COF


PROCESS TYPE3
READ EMRES
EMRES = 'GRIDDED' OR 'NONGRIDDED'?
NO
ERROR: INVALID EMISSIONS RESOLUTION
STOP
YES
RETURN TO READ COF

SECTION 4

INPUT/OUTPUT FORMAT DESCRIPTIONS

MODEL DATA EXTRACTION MODULE

This section presents descriptions of the files associated with MDEM and the diagnostic report generated. The descriptive names of the files are:

- MDEM Control Options File
- EIS/PS Master File (or preprocessed SAS File)
- EIS/AS Master File (or preprocessed SAS File)
- Area Source Emissions Files
- Point Source Emissions Files

The report is:

- MDEM Diagnostic Report

MDEM Control Options File

Control options are specified on three record types for point sources: Run Identification, SIC/SCC Definition and Major/Minor Point Source Definition records. For area sources, three record types are also specified in the control file: Run Identification, SIC/SCC Definition, and Pollutant Identification records. The Run Identification record, required for processing either point or area source emission files, informs MDEM which file type is to be processed in the program. "AS" directs MDEM to use the EIS area source format while "PS" identifies the point source format. An area of the record is reserved for requesting the level of detail of the diagnostic report, including a printout of the reduced emission files. For point sources, a minor flag is included for creation of major/minor point source files. The remainder of the Run Identification record is used to assign a label to the particular MDEM run, which will appear on the diagnostic report. Only one Run Identification record may be used per run.

The SIC/SCC record identifies industry categories for sources to be output to separate files. For each user-defined SIC/SCC combination, a file is created that contains only source records that correspond to each specified category. DD labels for subfiles are also specified on this record. If a source record does not match a specified SIC/SCC combination, it is output to a miscellaneous file. Up to 24 SIC/SCC combinations may be specified for point source files and 49 for area source files. For the 1980 NAPAP inventory, industry specific subfiles were not created.

The Major/Minor Point Source Definition record specifies the pollutant SAROAD codes and emission limits for determining whether a point source should be considered major or minor. One limit may be entered for each pollutant SAROAD code. MDEM can accommodate up to 15 limit specifications. DD labels for the subfiles are also specified on this record. This record is not included for an area source run. This option was not employed for 1980 point source data.

The Pollutant Identification record specifies the number of annual area source pollutants and the pollutant SAROAD codes and names. These records are used to extract the annual pollutants from the variables SAROAD1-15 and EMISS1-15. The following pages contain descriptions of the four different Control Options File records.

FILE NAME: MDEM Control Options File

RECORD NAME: Run Identification Record - Point and Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=1)
3	4	2	A	SOURCE	Area (='AS') or Point Source (='PS') Identifier
6	6	1	A	DETAIL	Detail of File Listing (='S', ='D', or for area sources only, ='T')
8	8	1	A	MINOR	Minor Flag[a] (='Y' or ='N')
10	71	62	A	RUN_ID	Run Identification Header

---

[a] For area source runs, column 8 is not used.

FILE NAME: MDEM Control Options File

RECORD NAME: SIC/SCC Definition Record - Point and Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=2)
3	6	4	N	SIC (INDX2)	SIC Code
8	15	8	N	SCC (INDX2)	SCC Code
17	24	8	A	SUBDD	DD Labels for SIC/SCC Subfiles

FILE NAME: MDEM Control Options File

RECORD NAME: Major/Minor Source Definition Record - Point Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=3)
3	7	5	N	LIM_ID (INDX3)	SAROAD Code[a]
9	15	7	N	LIM_TH (INDX3)	Emissions Limit for Pollutant (tons/yr)
17	24	8	A	SUBDD	DD Labels for Files or Subfiles

---

[a] A listing of pollutant SAROAD codes is given in Appendix F.

FILE NAME: MDEM Control Options File RECORD NAME: Pollutant Identification Record - Area Sources

Page 1 of 1

Record Position: Line 1

First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=3)
3	4	2	N	ANN	Number of Annual Pollutants ($1 \leq ANN \leq 15$)

Record Position: Lines 2-(ANN+1)[a]

First	Last	Length	Format	Variable Name	Description
1	1	1	b	TYPE	Record Identification (blank)
2	6	5	N	SAROAD	Pollutant SAROAD Code[c]
8	15	8	A	NAME	Pollutant Name[d]

---

[a] Repeat for the number of annual pollutants.

[b] Field must be left blank.

[c] A listing of pollutant SAROAD codes is given in Appendix F.

[d] Pollutant names specified for 1980 NAPAP processing are as follows: ASO_2, ASO_4, ATSP, APB, ACO, AHCl, AHF, ANO_x, ANH_3, AVOC, and ATHC, respectively.

EIS/PS Master File

There are four record types in the point source EIS Master File: Plant records, Point records, SCC records, and Comment records.

The Plant record provides descriptive data such as the plant name and address. This is the highest order record (Segment 0) in the EIS/PS master file hierarchy.

The Point record (Segment 1) supplies information concerning the location, operation, and dimensions of a discharge point within a plant. Up to 1,296 Point records may appear per Plant record.

The SCC record (Segment 2) contains process and emissions data for a Point record. Up to 15 SCC records may appear per Point record and each may specify up to 15 pollutants. The Comment record (Segment 3) is used to provide up to 99 comments per Point record. A description of the EIS/PS Master File appears on the following pages.

In processing the EIS/PS Master File, MDEM reduces the EIS/PS file size by dropping variables not referenced by FREDS. Variables extracted from the Master File by MDEM are assigned names per the following tables. Parameters not referenced by FREDS have a "-" under the heading variable name.

Preprocessed SAS File

The preprocessed SAS file contains one record per EISSCC, state, county, Plant ID, Point ID combination. The data recorded on the four EIS segment records are condensed into one record in the SAS file. MDEM processing for this file further reduces the data by dropping variables not referenced by FREDS. The main difference between MDEM processing of the SAS and EIS files is the complexity of the read statement, i.e., for the EIS/PS file, an extensive "input" statement, found in Appendix A, is necessary. For the SAS file, a simple SAS "set" statement is used. The user should refer to a SAS manual[4] for a complete explanation of the set and input statements.

FILE NAME: EIS/PS Master File RECORD NAME: Plant Record

Page 1 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
1	37	37	N	-	Sort Key
38	41	4	N	-	Record Size
42	43	2	-	-	Unused
44	45	2	N	-	State Code
46	49	4	N	-	County Code
50	52	3	N	-	AQCR
53	56	4	A	-	Plant ID
57	61	5	N	REC_DATE	Record Date (YYDDD)[a]
62	62	1	N	-	Record Type
63	64	2	-	-	Unused
65	67	3	A	-	User Control Region
68	69	2	A	-	Local Control
70	81	12	A	-	User Plant ID
82	85	4	N	-	City
86	87	2	N	UTM_ZONE	UTM Zone[b]
88	88	1	A	-	Ownership Code
89	103	15	A	-	Contact
104	113	10	A	-	Telephone

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[a] YYDDD refers to year and Julian day.

[b] A listing of UTM zones is given in "AEROS Manual Series Volume II: AEROS User's Manual (3rd ed.)"[5]

FILE NAME: EIS/PS Master File

RECORD NAME: Plant Record

Page 2 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
114	123	10	A	-	Principal Product
124	171	48	A	-	Name and Address
172	175	4	N	-	Number of Employees
176	181	6	N	-	Property Area
182	229	48	A	-	Mailing Address
230	230	1	A	-	NEDS P1 Card Flag
231	282	52	A	-	NEDS P7 Plant Comment
283	283	1	A	-	NEDS P7 Plant Card Flag
284	284	1	A	-	EIS 01 Card Flag
285	285	1	A	-	EIS 02 Card Flag
286	286	1	A	-	EIS 03 Card Flag
287	287	1	A	-	EIS 04 Card Flag
288	292	5	-	-	Unused

FILE NAME: EIS/PS Master File RECORD NAME: Point Record

Page 1 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
1	37	37	N	-	Sort Key
38	41	4	N	-	Record Size
42	43	2	-	-	Unused
44	45	2	N	STATE	AEROS State Code
46	49	4	N	COUNTY	AEROS County Code
50	52	3	N	AQCR	Air Quality Control Region
53	56	4	A	PLANT_ID	Plant ID
57	61	5	N	-	Date
62	62	1	N	-	Record Type
63	64	2	A	POINT_ID	NEDS Point ID
65	67	3	A	-	User Point ID
68	71	4	N	EISSIC	SIC Code
72	73	2	N	-	IPP Code
74	77	4	N	UTMX	UTM Horizontal Coordinate (km)
78	82	5	N	UTMY	UTM Vertical Coordinate (km)
83	88	6	N	LAT	Fractional Latitude (degrees, minutes, seconds)
89	95	7	N	LON	Fractional Longitude (degrees, minutes, seconds)
96	97	2	N	THRU-WIN	Winter Thruput (%)
98	99	2	N	THRU-SPR	Spring Thruput (%)
100	101	2	N	THRU-SUM	Summer Thruput (%)
102	103	2	N	THRU-FAL	Fall Thruput (%)
104	106	1	N	HOURS	Hours per Day

FILE NAME: EIS/PS Master File RECORD NAME: Point Record

Page 2 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
107	108	2	N	WEEKS	Weeks per Year
109	113	5	N	-	Boiler Design Capacity (10^6 Btu/hr)
114	116	3	N	-	Space Heat Percentage
117	120	4	N	STACK-HT	Stack Height (ft)
121	123	3	N	STACK-DI	Stack Diameter (ft)
124	127	4	N	STACK-TP	Stack Temperature (°F)
128	134	7	N	FLOW	Exhaust Flow Rate (ft^3/min)
135	139	5	N	VELOCITY	Velocity (ft/min)
140	143	4	N	PLUME_HT	Plume Height (ft)
144	147	4	N	-	Points with Common Stack
148	148	1	N	-	Compliance Status
149	152	4	N	-	Compliance Schedule
153	158	6	N	-	Compliance Update
159	159	1	N	-	ECAP
160	171	12	-	-	Control Regulations
172	172	1	A	-	NEDS P2 Card Flag
173	173	1	A	-	NEDS P3 Card Flag
174	174	1	A	-	NEDS P4 Card Flag
175	175	1	A	-	NEDS P5 Card Flag
176	176	1	A	-	PWCS NEDS Flag
177	228	52	A	-	NEDS P7 Point Comment
229	229	1	A	-	NEDS P7 Point Card Flag
230	230	1	A	-	EIS 11 Card Flag

FILE NAME: EIS/PS Master File RECORD NAME: Point Record

Page 3 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
231	231	1	A	-	EIS 12 Card Flag
232	232	1	A	-	EIS 14 Card Flag
233	238	6	-	-	Unused
239	240	2	N	-	Number of Point Pollutants
241	245	5	N	-	SAROAD Code of Controlled Pollutant
246	252	7	N	-	Control Equipment Cost
253	255	3	N	-	Primary Control Equipment
256	258	3	N	-	Secondary Control Equipment
259	261	3	N	CONEFF	Estimated Control Efficiency (%)
262	268	7	N	-	Estimated Emissions
269	275	7	N	-	Measured Emissions
276	282	7	N	-	Allowable Emissions
283	289	7	N	-	Potential Emissions
290	290	1	N	-	Emissions Units
291	291	1	N	ESTMET	Estimation Method[a]
292	292	1	N	-	Test Method
293	293	1	A	-	EIS 13 Card Flag

NOTE: Positions 241-293 can be repeated up to 15 times

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[a] A listing of NEDS point source estimation methods is given in Appendix F.

FILE NAME: EIS/PS Master File RECORD NAME: SCC Record

Page 1 of 2

Record Position					
First	Last	Length	Format	V riable Name	Description
1	37	37	N	-	Sort Key
38	41	4	N	-	Record Size
42	43	2	N	-	Unused
44	45	2	N	-	State Code
46	49	4	N	-	County Code
50	52	3	N	-	AQCR
53	56	4	A	-	Plant ID
57	61	5	N	-	Date
62	62	1	N	-	Record Type
63	64	2	A	-	NEDS Point ID
65	72	8	N	EISSCC	SCC Code
73	74	2	N	-	SCC Sequence Number
75	79	5	N	-	BEC Code
80	80	1	N	-	Fuel Units
81	87	7	N	-	Fuel Process Rate
88	94	7	N	-	Maximum Design Rate
95	97	3	N	-	Sulfur Content
98	100	3	N	-	Ash Content
101	105	5	N	-	Heat Content
106	106	1	N	-	Confidentiality
107	107	1	A	-	Source Code
108	132	25	A	-	Source Description
133	133	1	A	-	EMF Origin
134	134	1	A	-	NEDS P6 Card Flag

FILE NAME: EIS/PS Master File RECORD NAME: SCC Record

Page 2 of 2

Record Position First	Record Position Last	Length	Format	Variable Name	Description
135	186	52	A	-	NEDS P7 SCC Comment
187	187	1	A	-	NEDS P7 SCC Card Flag
188	188	1	A	-	EIS 21 Card Flag
189	189	1	A	-	EIS 22 Card Flag
190	190	1	A	-	EIS 24 Card Flag
191	191	1	A	-	EIS 25 Card Flag
192	196	5	A	-	Unused
197	198	2	N	NUMPOLL	Number of SCC Pollutants
199	203	5	N	SAROAD	SCC Pollutant ID
204	212	9	N	-	Emission Factor
213	213	1	A	-	EIS 23 Card Flag
214	214	1	A	-	Ash-Sulfur Code
215	215	1	N	-	EMF Units
216	222	7	N	EMISS	Apportioned Annual Emissions (tons/yr)

NOTE: Positions 199-222 can be repeated up to 15 times

FILE NAME: EIS/PS Master File RECORD NAME: Comment Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	37	37	N	-	Sort Key
38	41	4	N	-	Record Size
42	43	2	-	-	Unused
44	45	2	N	-	State Code
46	49	4	N	-	County Code
50	52	3	N	-	AQCR
53	56	4	A	-	Plant ID
57	61	5	N	-	Date
62	62	1	N	-	Record Type
63	64	2	A	-	NEDS Point ID
65	66	2	N	-	PNR Sequence Number
67	69	3	N	-	PNR Line Number
70	70	1	A	-	EIS 30 Card Flag
71	172	102	A	-	Comment

EIS/AS Master File

The EIS/AS Master File contains three record types: Description records, Category records, and Comment records. The Description record (Segment 0) provides identification, location, geographic, and total emissions data for each county.

The Category record (Segment 1) has detailed temporal information and apportioned annual emissions data for specific categories of emissions. Up to 15 pollutants can be contained in one Category record.

The Comment record (Segment 2) can contain up to 999 lines.

A complete format list of the three EIS/AS Master File records is included in the following pages. For FREDS processing, MDEM reduces the number of pollutant emissions variables from 30 to 15 by extracting pollutants contained in EMISS1-15 and SAROAD1-15 into single variables defined by pollutant name. In addition, extraneous information is dropped to minimize file overhead. Variables extracted from the Master File to be used in FREDS are assigned names per the following pages. Parameters not referenced by FREDS have a "-" under the heading variable name.

Preprocessed SAS File

The preprocessed SAS area source file contains one record for each EISSCC, State, and County combination. The three Master File records are condensed into one to further minimize file overhead. MDEM processing of the SAS formatted area source file is similar to that of the EIS/AS file with the exception of the format for reading the data. For reading the EIS/AS file, a detailed "input" statement is required (see Appendix A, MDEM-Area Sources); for the preprocessed SAS file, a simple "set" statement is used.[4]

FILE NAME: EIS/AS Master File RECORD NAME: Description Record

Page 1 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	-	State Code
3	6	4	N	-	County Code
7	9	3	N	-	Unused
10	10	1	N	-	Retrieval Batch Code
11	15	5	N	-	Geographic Suballocation Number
16	18	3	N	-	Category Number
19	20	2	N	-	Category Disaggregation Number
21	21	1	N	-	Record Type Key
22	24	3	N	-	Line Number
25	28	4	N	-	Record Length
29	31	3	N	-	AQCR
32	33	2	N	-	Record Type
34	35	2	N	-	Year
36	38	3	N	-	Day Code
39	41	3	N	-	Air Basin
42	45	4	N	-	Standard Metropolitan Statistical Area (SMSA)
46	65	20	A	-	Area Name
66	85	20	A	-	Majority Activity
86	89	4	N	-	Associated Plant ID
90	91	2	N	-	SIP Base Year
92	93	2	N	-	Projected Year
94	95	2	N	-	Rural Population Percentage
96	103	8	N	-	Population

FILE NAME: EIS/AS Master File RECORD NAME: Description Record

Page 2 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
104	157	54	A	-	AQCR Name
158	159	2	N	-	Suballocation Technique Code
160	179	20	N	-	Suballocation Technique Description
180	182	3	N	-	Defined Area Code
183	184	2	N	-	Sulfur Content-Anthracite Coal
185	186	2	N	-	Sulfur Content-Bituminous Coal
187	188	2	N	-	Sulfur Content-Distillate Oil
189	190	2	N	-	Sulfur Content-Residual Oil
191	193	3	N	-	Ash Content-Anthracite Coal
194	196	3	N	-	Ash Content-Bituminous Coal
197	197	1	N	-	Number UTM Coordinates
198	199	2	N	-	UTM Zone 1
200	203	4	N	-	UTM Horizontal 1
204	208	5	N	-	UTM Vertical 1
209	210	2	N	-	UTM Zone 2
211	214	4	N	-	UTM Horizontal 2
215	219	5	N	-	UTM Vertical 2
220	221	2	N	-	UTM Zone 3
222	225	4	N	-	UTM Horizontal 3
226	230	5	N	-	UTM Vertical 3
231	232	2	N	-	UTM Zone 4
233	236	4	N	-	UTM Horizontal 4
237	241	5	N	-	UTM Vertical 4

FILE NAME: EIS/AS Master File RECORD NAME: Description Record

Page 3 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
242	243	2	N	-	UTM Zone 5
244	247	4	N	-	UTM Horizontal 5
248	252	5	N	-	UTM Vertical 5
253	254	2	N	-	UTM Zone 6
255	258	4	N	-	UTM Horizontal 6
259	263	5	N	-	UTM Vertical 6
264	264	1	N	-	Source Type
265	271	7	N	-	Length or Area
272	273	2	N	-	Units Code for Length or Area
274	278	5	N	-	TSP SIP Estimate
279	282	4	N	-	SO_2 SIP Estimate
283	286	4	N	-	NO_x SIP Estimate
287	291	5	N	-	HC SIP Estimate
292	296	5	N	-	CO SIP Estimate
297	351	55	-	-	Reserved for Future SIP Estimates
352	352	1	N	-	Population Code
353	359	7	N	-	Gas Fuel for Light Vehicles
360	365	6	N	-	Gas Fuel for Heavy Vehicles
366	371	6	N	-	Diesel Fuel for Heavy Vehicles
372	377	6	N	-	Motor Vehicle Miles for Limited Access Roads
378	383	6	N	-	Motor Vehicle Miles for Rural Roads

FILE NAME: EIS/AS Master File RECORD NAME: Description Record

Page 4 of 4

Record Position First	Last	Length	Format	Variable Name	Description
384	389	6	N	–	Motor Vehicle Miles for Suburban Roads
390	396	6	N	–	Motor Vehicle Miles for Urban Roads
397	414	18	–	–	Unused
415	415	1	N	–	NEDS A3 Flag
416	416	1	N	–	NEDS A4 Flag
417	417	1	N	–	NEDS A1 Flag
418	418	1	N	–	EIS Description Card 1 Flag
419	419	1	N	–	EIS Description Card 2 Flag
420	420	1	N	–	EIS Description Card 3 Flag
421	421	1	N	–	EIS Description Card 4 Flag
422	422	1	N	–	EIS Description Card 5 Flag
423	423	1	N	–	EIS Description Card 6 Flag
424	425	2	N	–	DESC-NBR-POLL
426	430	5	N	–	Pollutant ID
431	445	15	A	–	Pollutant Name
446	446	1	N	–	Attainment Status
447	452	6	N	–	AQMA Number
453	453	1	N	–	EIS Description Card 7 Flag

NOTE: Record positions 426-453 may be repeated up to 15 times

FILE NAME: EIS/AS Master File RECORD NAME: Category Record

Page 1 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	STATE	AEROS State Code
3	6	4	N	COUNTY	AEROS County Code
7	9	3	N	-	Unused
10	10	1	N	-	Retrieval Batch Code
11	15	5	N	-	Geographic Suballocation Number
16	18	3	N	EISSCC	"Pseudo" SCC Code[a]
19	20	2	N	-	Category Disaggregation Number
21	21	1	N	-	Record Type Key
22	24	3	N	-	Line Number
25	28	4	N	-	Record Length
29	31	3	N	AQCR	Air Quality Control Region
32	33	2	N	-	Record Type
34	58	25	N	-	Category Description
59	60	2	N	-	Year of Information
61	69	9	N	-	Process Rate
70	76	7	N	-	Category Adjustment Value
77	78	2	N	-	Units Code
79	90	12	N	-	Units Code Description

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[a] "Pseudo" SCC codes of U.S. and Canada are given in Appendix F.

FILE NAME: EIS/AS Master File RECORD NAME: Category Record

Page 2 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
91	91	1	N	-	Uniform Thruput[b]
92	93	2	N	-	January Thruput (%)
94	95	2	N	-	February Thruput (%)
96	97	2	N	-	March Thruput (%)
98	99	2	N	-	April Thruput (%)
100	101	2	N	-	May Thruput (%)
102	103	2	N	-	June Thruput (%)
104	105	2	N	-	July Thruput (%)
106	107	2	N	-	August Thruput (%)
108	109	2	N	-	September Thruput (%)
110	111	2	N	-	October Thruput (%)
112	113	2	N	-	November Thruput (%)
114	115	2	N	-	December Thruput (%)
116	117	2	N	-	Hours per Day
118	118	1	N	-	Days per Week
119	120	2	N	-	Weeks per Year
121	124	4	N	-	Thruput Ratio
125	134	10	N	-	Maximum Hourly Thruput

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[b] Y = Monthly thruputs are uniform (monthly thruput fields should not be coded).
N = Monthly thruputs are not uniform (monthly thruput fields should not be coded).

FILE NAME: EIS/AS Master File RECORD NAME: Category Record

Page 3 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
135	135	1	N	–	Data Confidence Rating
136	138	3	N	–	Nitrogen Content
139	140	2	N	–	Sulfur Content
141	143	3	N	–	Ash Content
144	147	4	N	–	Heat Content
148	148	1	N	–	Uniform Hourly Thruput[c]
149	150	2	N	–	Thruput for Hour Beginning 0000 (%)
151	152	2	N	–	Thruput for Hour Beginning 0100 (%)
153	154	2	N	–	Thruput for Hour Beginning 0200 (%)
155	156	2	N	–	Thruput for Hour Beginning 0300 (%)
157	158	2	N	–	Thruput for Hour Beginning 0400 (%)
159	160	2	N	–	Thruput for Hour Beginning 0500 (%)
161	162	2	N	–	Thruput for Hour Beginning 0600 (%)
163	164	2	N	–	Thruput for Hour Beginning 0700 (%)
165	166	2	N	–	Thruput for Hour Beginning 0800 (%)
167	168	2	N	–	Thruput for Hour Beginning 0900 (%)
169	170	2	N	–	Thruput for Hour Beginning 1000 (%)
171	172	2	N	–	Thruput for Hour Beginning 1100 (%)

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[c] Y = Hourly thruputs are uniform (hourly thruput fields should not be coded).
N = Hourly thruputs are not uniform (hourly thruput fields should not be coded).

FILE NAME: EIS/AS Master File RECORD NAME: Category Record

Page 4 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
173	174	2	N	-	Thruput for Hour Beginning 1200 (%)
175	176	2	N	-	Thruput for Hour Beginning 1300 (%)
177	178	2	N	-	Thruput for Hour Beginning 1400 (%)
179	180	2	N	-	Thruput for Hour Beginning 1500 (%)
181	182	2	N	-	Thruput for Hour Beginning 1600 (%)
183	184	2	N	-	Thruput for Hour Beginning 1700 (%)
185	186	2	N	-	Thruput for Hour Beginning 1800 (%)
187	188	2	N	-	Thruput for Hour Beginning 1900 (%)
189	190	2	N	-	Thruput for Hour Beginning 2000 (%)
191	192	2	N	-	Thruput for Hour Beginning 2100 (%)
193	194	2	N	-	Thruput for Hour Beginning 2200 (%)
195	196	2	N	-	Thruput for Hour Beginning 2300 (%)
197	230	34	A	-	NEDS A7 Comment
231	231	1	N	-	Information Source Code
232	251	20	A	-	Information Source Narrative
252	271	20	-	-	Unused
272	272	1	N	-	EIS Category Card 1 Flag
273	273	1	N	-	EIS Category Card 2 Flag
274	274	1	N	-	EIS Category Card 3 Flag
275	275	1	N	-	EIS Category Card 4 Flag
276	276	1	N	-	NEDS Flag
277	277	1	N	-	NEDS A7 Flag
278	279	2	N	NUMPOLL	Number of Pollutants

FILE NAME: EIS/AS Master File RECORD NAME: Category Record

Page 5 of 5

Record Position		Length	Format	Variable Name	Description
First	Last				
280	284	5	N	SAROAD	Pollutant ID
285	294	10	N	–	Emission Factor
295	295	1	N	–	Emission Factor Confidence Rating
296	296	1	N	–	Emission Factor Source Code
297	297	1	N	–	Emission Factor Origin
298	307	10	N	–	Pollutant Specific Data
308	314	7	N	–	NEDS A7 Emission
315	329	15	A	–	Pollutant Name
330	330	1	N	–	EIS Category Card 5 Flag
331	337	7	N	EMISS	Annual Emissions Estimate (tons/yr)
338	338	1	N	–	Confidence Rating
339	344	6	N	–	Maximum Hourly Emissions

NOTE: Record position 280-344 may be repeated up to 15 times

FILE NAME: EIS/AS Master File

RECORD NAME: Comment Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	-	State Code
3	6	4	N	-	County Code
7	9	3	N	-	Unused
10	10	1	N	-	Retrieval Batch Code
11	15	5	N	-	Geographic Suballocation Number
16	18	3	N	-	Category Number
19	20	2	N	-	Category Disaggregation Number
21	21	1	N	-	Record Type Key
22	24	3	N	-	Line Number
25	28	4	N	-	Record Length
29	31	3	N	-	AQCR
32	33	2	N	-	Record Type
34	133	100	A	-	Comment
134	134	1	N	-	NEDS A6 Flag
135	135	1	N	-	EIS Comment Card 1 Flag
136	136	1	N	-	EIS Comment Card 1 Flag

Point Source Emissions File(s)

The Point Source Emissions File(s) contains emissions and stack data for annual point source pollutants. The MDEM has the capability of creating one or more point source emissions files or subfiles (major and minor point sources based on user defined emission units) for each user specified SIC/SCC combination specified in the Control Options File. For 1980 processing, this application was not used, i.e., only one point source file was output by MDEM. Each output file is SAS formatted and contains one record per EIS/PS SCC Record (Segment 2). The format of the MDEM point source output file follows.

FILE NAME: Point Source Emissions File RECORD NAME: Major/Minor Point Source Record

Page 1 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
N/A[a]				STATE	AEROS State Code
				COUNTY	AEROS County Code
				AQCR	Air Quality Control Region
				PLANT_ID	Plant Identification Code
				POINT_ID	Point Identification Code
				REC_DATE	Record Date (year)
				UTM_ZONE	UTM Zone
				UTMX	UTM Horizontal Coordinate
				UTMY	UTM Vertical Coordinate
				LAT_DEG	Latitude Degrees
				LAT_MIN	Latitude Minutes
				LAT_SEC	Latitude Seconds
				LON_DEG	Longitude Degrees
				LON-MIN	Longitude Minutes
				LON_SEC	Longitude Seconds
				EISSIC	SIC Code
				EISSCC	SCC Code
				SOURCE	Source Type

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[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name.

FILE NAME: Point Source Emissions File

RECORD NAME: Major/Minor Point Source Record

Page 2 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
				THRU_WIN	Winter Throughput Percent
				THRU_SUM	Summer Throughput Percent
				THRU_SPR	Spring Throughput Percent
				THRU_FAL	Fall Throughput Percent
				HOURS	Hours per Day
				DAYS	Days per Week
				WEEKS	Weeks per Year
				NUMPOLL	Number of Pollutants
				SAROAD1	Pollutant ID 1
				EMISS1	Emissions for SAROAD 1 (tons/yr)
				SAROAD2	Pollutant ID 2
				EMISS2	Emissions for SAROAD 2 (tons/yr)
				SAROAD3	Pollutant ID 3
				EMISS3	Emissions for SAROAD 3 (tons/yr)
				SAROAD4	Pollutant ID 4
				EMISS4	Emissions for SAROAD 4 (tons/yr)
				SAROAD5	Pollutant ID 5
				EMISS5	Emissions for SAROAD 5 (tons/yr)
				SAROAD6	Pollutant ID 6
				EMISS6	Emissions for SAROAD 6 (tons/yr)
				SAROAD7	Pollutant ID 7
				EMISS7	Emissions for SAROAD 7 (tons/yr)

FILE NAME: Point Source Emissions File RECORD NAME: Major/Minor Point Source Record

Page 3 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
				SAROAD8	Pollutant ID 8
				EMISS8	Emissions for SAROAD 8 (tons/yr)
				SAROAD9	Pollutant ID 9
				EMISS9	Emissions for SAROAD 9 (tons/yr)
				SAROAD10	Pollutant ID 10
				EMISS10	Emissions for SAROAD 10 (tons/yr)
				SAROAD11	Pollutant ID 11
				EMISS11	Emissions for SAROAD 11 (tons/yr)
				SAROAD12	Pollutant ID 12
				EMISS12	Emissions for SAROAD 12 (tons/yr)
				SAROAD13	Pollutant ID 13
				EMISS13	Emissions for SAROAD 13 (tons/yr)
				SAROAD14	Pollutant ID 14
				EMISS14	Emissions for SAROAD 14 (tons/yr)
				SAROAD15	Pollutant ID 15
				EMISS15	Emissions for SAROAD 15 (tons/yr)
				PLUME_HT	Plume Height (ft)
				STACK_TP	Stack Temperature (°F)
				STACK_HT	Stack Height (ft)
				STACK_DI	Stack Diameter (ft)

FILE NAME: Point Source Emissions File RECORD NAME: Major/Minor Point Source Record

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Record Position First	Last	Length	Format	Variable Name	Description
				FLOW	Exhaust Flow Rate (ft^3/min)
				VELOCITY	Exit Velocity (ft/min)
				MAJOR	Major Point Source Flag[b]
				CONEFF	Estimated Control Efficiency (%)
				ESTMET	Estimation Method

NOTE: CONEFF and ESTMET will be repeated NUMPOLL (up to 15) times, once for each pollutant.

[b] MAJOR = 1 for user defined major point source (for NAPAP 1980, MAJOR always equals 1).

= 0 if source is not a user defined major point source.

Area Source Emissions File

The Area Source Emissions File contains one record type in SAS file format. Each record contains area source identification, an emission category (SCC), and apportioned emissions data. Up to 15 pollutants are included per record. MDEM places no limit to the number of area source categories per county. Each record reflects an EIS County/Category (Segment 2) record. The file format is listed in the following pages. For the 1980 NAPAP inventory, only one area source file was output by MDEM. However, if desired, SCC defined subfiles may be created by specifying the appropriate options on the SIC/SCC Definition Record of the MDEM Control Options File.

FILE NAME: Area Source Emissions File RECORD NAME: Area Source Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
N/A[a]				STATE	AEROS State Code
				COUNTY	AEROS County Code
				EISSCC	"Pseudo" SCC Code[b]
				ASO_2	Emissions for SO_2 (tons/yr)
				ASO_4	Emissions for SO_4 (tons/yr)
				ATSP	Emissions for TSP (tons/yr)
				APB	Emissions for PB (tons/yr)
				ACO	Emissions for CO (tons/yr)
				AHCL	Emissions for HCL (tons/yr)
				AHF	Emissions for HF (tons/yr)
				ANO_x	Emissions for NO_x (tons/yr)
				ANH_3	Emissions for NH_3 (tons/yr)
				AVOC	Emissions for VOC (tons/yr)
				ATHC	Emissions for THC (tons/yr)

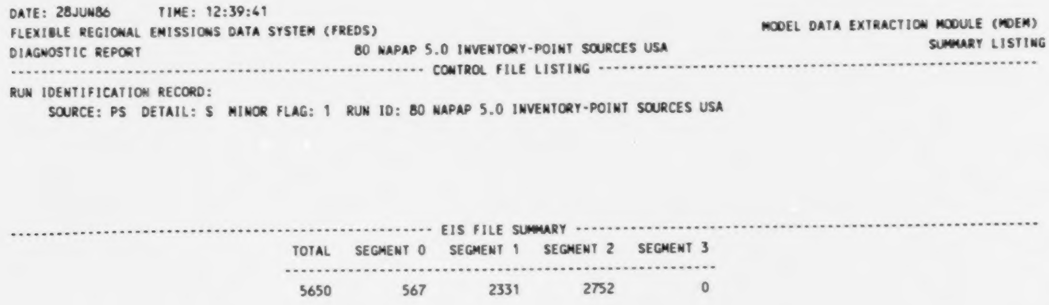
---

[a] SAS Files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] "Pseudo" SCC codes for U.S. and Canadian area sources are given in Appendix F.

MDEM Diagnostic Report

The MDEM diagnostic report will vary depending on whether MDEM is processing EIS or preprocessed SAS files, point or area sources and the level of detail specified. For both source types, run date and time, title, control options, and number of pollutant identification records processed will appear on the diagnostic report. If an EIS file is processed, an EIS file summary including record counts for each segment is also printed. A total count of sources processed plus a listing of any error messages are included with the SAS summary. For point sources, the number of records in each industry subfile (SIC/SCC combination) divided into major and minor sources will be included with any error messages on the report. If emissions totals are requested for area source emissions, these will also be output. If a detailed report is requested, emissions file listings will be printed. Sample diagnostic reports were generated, using a subset of the 1980 NAPAP data base. A summary report for MDEM point source processing is illustrated in Figure 4-1. Figure 4-2 presents a detailed report for area source processing.

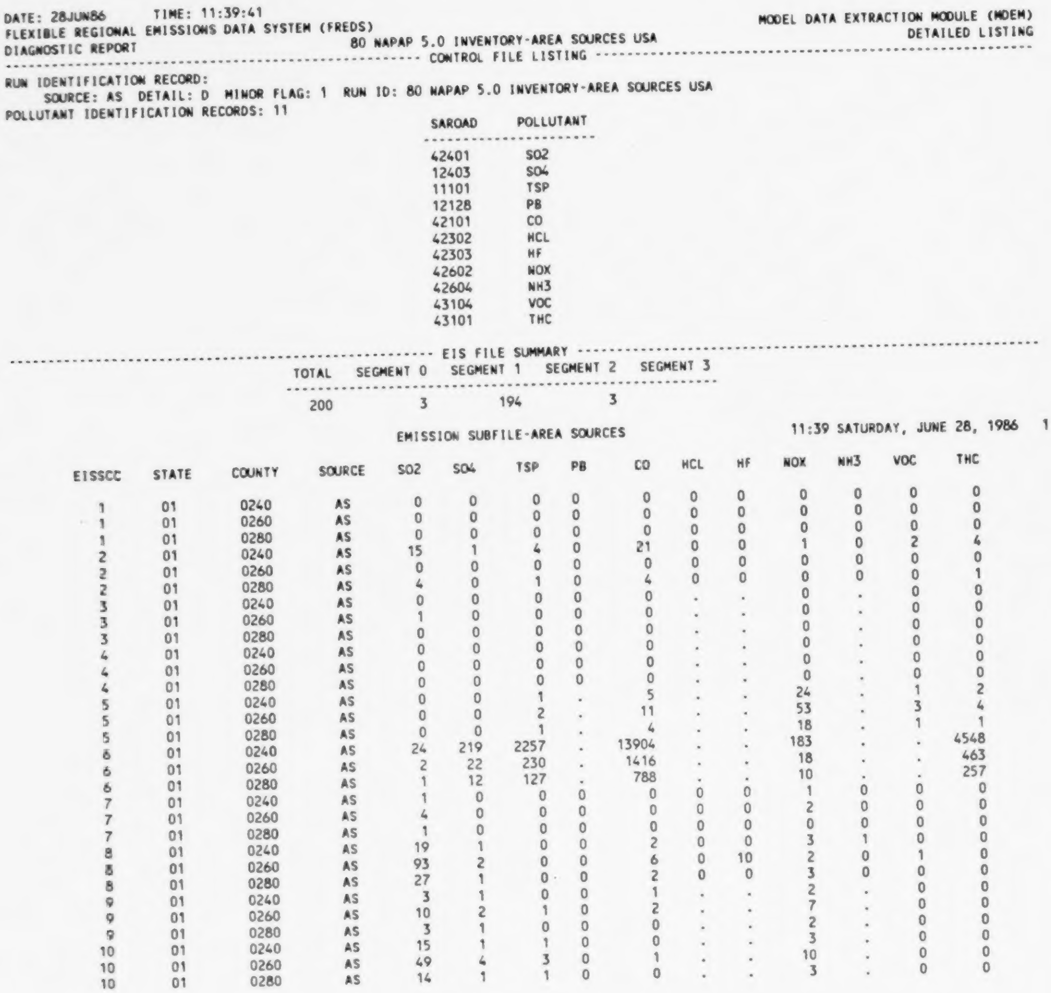


```
DATE: 28JUN86      TIME: 12:39:41
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                         MODEL DATA EXTRACTION MODULE (MDEM)
DIAGNOSTIC REPORT                              80 NAPAP 5.0 INVENTORY-POINT SOURCES USA                      SUMMARY LISTING
------------------------------------------------------- CONTROL FILE LISTING ----------------------------------------------------------
RUN IDENTIFICATION RECORD:
     SOURCE: PS  DETAIL: S  MINOR FLAG: 1  RUN ID: 80 NAPAP 5.0 INVENTORY-POINT SOURCES USA




-------------------------------------------------------- EIS FILE SUMMARY ------------------------------------------------------------
                                     TOTAL   SEGMENT 0   SEGMENT 1   SEGMENT 2   SEGMENT 3
                                     ----------------------------------------------------
                                      5650         567        2331        2752           0
```

Figure 4-1. MDEM sample "summary" diagnostic report - point sources.



```
DATE: 28JUN86       TIME: 11:39:41                                                          MODEL DATA EXTRACTION MODULE (MDEM)
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                                             DETAILED LISTING
DIAGNOSTIC REPORT                             80 NAPAP 5.0 INVENTORY-AREA SOURCES USA
------------------------------------------------ CONTROL FILE LISTING ----------------------------------------------------------
RUN IDENTIFICATION RECORD:
    SOURCE: AS  DETAIL: D  MINOR FLAG: 1  RUN ID: 80 NAPAP 5.0 INVENTORY-AREA SOURCES USA
POLLUTANT IDENTIFICATION RECORDS: 11
                                              SAROAD     POLLUTANT
                                             ----------------------
                                              42401      SO2
                                              12403      SO4
                                              11101      TSP
                                              12128      PB
                                              42101      CO
                                              42302      HCL
                                              42303      HF
                                              42602      NOX
                                              42604      NH3
                                              43104      VOC
                                              43101      THC
------------------------------------------------- EIS FILE SUMMARY ------------------------------------------------------------
                                   TOTAL   SEGMENT 0   SEGMENT 1   SEGMENT 2   SEGMENT 3
                                   ---------------------------------------------------------
                                    200        3          194          3

                                             EMISSION SUBFILE-AREA SOURCES                      11:39 SATURDAY, JUNE 28, 1986   1

   EISSCC    STATE     COUNTY     SOURCE    SO2    SO4    TSP   PB      CO    HCL    HF     NOX    NH3    VOC     THC

      1       01        0240        AS        0      0      0    0       0     0     0       0      0      0       0
      1       01        0260        AS        0      0      0    0       0     0     0       0      0      0       0
      1       01        0280        AS        0      0      0    0       0     0     0       0      0      0       0
      2       01        0240        AS       15      1      4    0      21     0     0       1      0      2       4
      2       01        0260        AS        0      0      0    0       0     0     0       0      0      0       0
      2       01        0280        AS        4      0      1    0       4     0     0       0      0      0       1
      3       01        0240        AS        0      0      0    0       0     .     .       0      .      0       0
      3       01        0260        AS        1      0      0    0       0     .     .       0      .      0       0
      3       01        0280        AS        0      0      0    0       0     .     .       0      .      0       0
      4       01        0240        AS        0      0      0    0       0     .     .       0      .      0       0
      4       01        0260        AS        0      0      0    0       0     .     .       0      .      0       0
      4       01        0280        AS        0      0      0    0       0     .     .       0      .      0       0
      5       01        0240        AS        0      0      1    .       5     .     .      24      .      1       2
      5       01        0260        AS        0      0      2    .      11     .     .      53      .      3       4
      5       01        0280        AS        0      0      1    .       4     .     .      18      .      1       1
      6       01        0240        AS       24    219   2257    .   13904     .     .     183      .      .    4548
      6       01        0260        AS        2     22    230    .    1416     .     .      18      .      .     463
      6       01        0280        AS        1     12    127    .     788     .     .      10      .      .     257
      7       01        0240        AS        1      0      0    0       0     0     0       1      0      0       0
      7       01        0260        AS        4      0      0    0       0     0     0       2      0      0       0
      7       01        0280        AS        1      0      0    0       0     0     0       0      0      0       0
      8       01        0240        AS       19      1      0    0       2     0     0       3      1      0       0
      8       01        0260        AS       93      2      0    0       6     0    10       2      0      1       0
      8       01        0280        AS       27      1      0    0       2     0     0       3      0      0       0
      9       01        0240        AS        3      1      0    0       1     .     .       2      .      0       0
      9       01        0260        AS       10      2      1    0       2     .     .       7      .      0       0
      9       01        0280        AS        3      1      0    0       0     .     .       2      .      0       0
     10       01        0240        AS       15      1      1    0       0     .     .       3      .      0       0
     10       01        0260        AS       49      4      3    0       1     .     .      10      .      0       0
     10       01        0280        AS       14      1      1    0       0     .     .       3      .      0       0
```

Figure 4-2. MDEM sample "detailed" diagnostic report - area sources.

```
11   01   0240   AS      0     0     0   .      1   .   .      6    .      0    0
11   01   0260   AS      0     0     1   .      4   .   .     20    .      1    2
11   01   0280   AS      0     0     0   .      1   .   .      6    .      0    0
12   01   0240   AS      0     0     0   .      0   .   .      0    .      0    0
12   01   0260   AS      0     0     0   .      0   .   .      0    .      0    0
12   01   0280   AS      0     0     0   .      0   .   .      0    .      0    0
13   01   0240   AS      0     0     0   0      0   0   0      0    0      0    0
13   01   0260   AS      0     0     0   0      0   0   0      0    0      0    0
13   01   0280   AS      0     0     0   0      0   0   0      0    0      0    0
14   01   0240   AS     33     1     0   0      1   0   0      8    1      0    0
14   01   0260   AS    834    19     5   0     18   1   0    138   14      0    1
14   01   0280   AS    246     6     2   0      5   0   0     41    4      0    0
15   01   0240   AS      0     0     0   .      0   .   .      0    .      0    0
15   01   0260   AS      0     0     0   .      0   .   .      0    .      0    0
15   01   0280   AS      0     0     0   .      0   .   .      0    .      0    0
16   01   0240   AS      0     0     0   0      0   .   .      0    .      0    0
16   01   0260   AS      0     0     0   0      0   .   .      0    .      0    0
16   01   0280   AS      0     0     0   0      0   .   .      0    .      0    0
17   01   0240   AS      0     0     0   0      0   .   .      0    .      0    0
17   01   0260   AS      0     0     0   0      0   .   .      0    .      0    0
17   01   0280   AS      0     0     0   0      0   .   .      0    .      0    0
18   01   0240   AS      0     0     0   .     15   .   .    115    .     41    1
18   01   0260   AS      0     0     0   .    102   .   .    771    .    278    4
18   01   0280   AS      0     0     0   .     50   .   .    377    .    136    2
```

Figure 4-2. MDEM sample "detailed" diagnostic report - area sources (continued).

TEMPORAL ALLOCATION MODULE

The Temporal Allocation Module (TAM) accepts emission files or subfiles from any of the FREDS modules as input. This section presents the files accessed by the TAM:

- TAM Control Options File
- MTPREP Control Options File
- Time Zone File
- Temporal Allocation Factor File
- Temporally Allocated Emissions Files

The report is:

- TAM Diagnostic Report

TAM Control Options File

The TAM Control Options File contains one record type for point sources and three record types for area sources. The Run Identification record contains the following information for both source types: source type, level of detail for the diagnostic report, and SAS member name of the input emissions file. The number of temporal scenarios desired is required for point source runs. For area source runs, the number corresponding to a specific temporal scenario and a daylight savings flag is also required on the Run Identification record. The Pollutant Variable List record provides the variable name of each pollutant and is also required for area source runs. The third record, the Resolution record, defines the level of resolution of the input emissions. This allows the user flexibility of processing spatially allocated emissions (i.e., by column and row) or county level emissions (defined by SCC, State, County) by specifying "gridded" or "nongridded" in the control file.

A separate COF is input for MTPREP execution (MTPREP.FORT and MTPREP.SAS). This file has one record type and controls the number of pollutants which are multiplied by their temporal allocation factors and the level of resolution of the emissions data (gridded or nongridded). The same COF is used for execution of both MTPREP.FORT and MTPREP.SAS. The MTPREP job steps are executed for temporal allocation of area sources only.

FILE NAME: TAM Control Options File RECORD NAME: Run Identification Record - Point Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=1)
3	4	2	A	SOURCE	Source Type of Emissions File (='PS')
6	7	1	A	DETAIL	Level of Detail for the Diagnostic Report (='D' or ='S')
8	15	8	A	SASMEM	SAS Member Name of Input and Output Emissions Files
17	18	2	N	TAFDAY	Number of Temporal Scenarios to be Allocated
20	71	52	A	RUN_ID	Run Identification Header

FILE NAME: TAM Control Options File   RECORD NAME: Run Identification Record - Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=1)
3	4	2	A	SOURCE	Source Type of Emissions File (='AS')
6	7	1	A	DETAIL	Level of Detail for the Diagnostic Report (='D' or ='S')
8	15	8	A	SASMEM	SAS Member Name of Input and Output Emissions Files
17	18	2	N	TAFDAY[a]	Code Number of Temporal Scenario to be Allocated
20	20	1	N	DAYLITE[b]	Daylight Savings Indicator for GMT offset
22	71	50	A	RUN_ID	Run Identification Header

---

[a] A listing of temporal scenario codes is given in Appendix F.

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

FILE NAME: TAM Control Options File RECORD NAME: Pollutant Variable List Record - Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=2)
3	72	70	A	LIST	List of Pollutant Variable Names[a]

---

[a] For the 1980 NAPAP Version 5.2 area source inventory, the pollutant variable list is as follows: SO_2, SO_4, TSP, PB, CO, HCL, HF, NO_x, NH_3, VOC, THC, SE1-SE31 (for Version 5.3, SE31 is changed to SE12).

FILE NAME: TAM Control Options File RECORD NAME: Resolution Record - Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=3)
3	12	10	A	EMRES	Level of Resolution of input emissions data (='gridded' or ='nongridded')[a]

---

[a] Gridded refers to spatially allocated emissions (resolved by column and row). Nongridded refers to county level emissions (by SCC, State, County).

FILE NAME: MTPREP Control Options File[a]
(Area Sources only)

RECORD NAME: Area Source Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	3	3	N	NUMPOLL	Number of Pollutants (maximum=100)
5	14	10	A	EMRES	Level of resolution of emissions data (='gridded' or ='nongridded')

---

[a] This control file is applicable to MTPREP.FORT AND MTPREP.SAS.

Time Zone File

FILE NAME: Time Zone File RECORD NAME: Time Zone Record

Page 1 of 1

Record Position

First	Last	Length	Format	Variable Name	Description
1	2	2	N	STATE	AEROS State Code
3	6	4	N	COUNTY	AEROS County Code
7	7	1	N	ZONE	Time Zone Flag[a]
8	8	1	N	DAYLITE	Daylight Savings Indicator[b] for GMT offset and temporal processing

---

[a] For Time Zone Flag:

1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

Temporal Allocation Factor File

FILE NAME: Temporal Allocation Factor File

RECORD NAME: Temporal Allocation Factor Record

Page 1 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	NUM_DAY	Temporal Scenario Code[a]
3	4	2	N	STATE	AEROS State Code
5	8	4	N	COUNTY	AEROS County Code
9	16	8	N	EISSCC	SCC (Source Classification Code)
17	19	3	N	SEA	Seasonal Emission Fraction
20	23	4	N	DAY	Daily Emission Fraction
24	26	3	N	HOUR1	Hour 1 Emission Fraction[b]
27	29	3	N	HOUR2	Hour 2 Emission Fraction
30	32	3	N	HOUR3	Hour 3 Emission Fraction
33	35	3	N	HOUR4	Hour 4 Emission Fraction
36	38	3	N	HOUR5	Hour 5 Emission Fraction
39	41	3	N	HOUR6	Hour 2 Emission Fraction
42	44	3	N	HOUR7	Hour 7 Emission Fraction
45	47	3	N	HOUR8	Hour 8 Emission Fraction
48	50	3	N	HOUR9	Hour 9 Emission Fraction
51	53	3	N	HOUR10	Hour 10 Emission Fraction

---

[a] Temporal scenario codes are given in Appendix F.

[b] Hour 1 is defined as midnight to 1 AM local time.

FILE NAME: Temporal Allocation Factor File RECORD NAME: Temporal Allocation Factor Record

Page 2 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
54	56	3	N	HOUR11	Hour 11 Emission Fraction
57	59	3	N	HOUR12	Hour 12 Emission Fraction
60	62	3	N	HOUR13	Hour 13 Emission Fraction
63	65	3	N	HOUR14	Hour 14 Emission Fraction
66	68	3	N	HOUR15	Hour 15 Emission Fraction
69	71	3	N	HOUR16	Hour 16 Emission Fraction
72	74	3	N	HOUR17	Hour 17 Emission Fraction
75	77	3	N	HOUR18	Hour 18 Emission Fraction
78	80	3	N	HOUR19	Hour 19 Emission Fraction
81	83	3	N	HOUR20	Hour 20 Emission Fraction
84	86	3	N	HOUR21	Hour 21 Emission Fraction
87	89	3	N	HOUR22	Hour 22 Emission Fraction
90	92	3	N	HOUR23	Hour 23 Emission Fraction
93	95	3	N	HOUR24	Hour 24 Emission Fraction

Temporally Allocated Emissions Files

Temporally Allocated Point Source Emissions File--

The TAM point source output contains source location (latitude, longitude), identification (Plant_ID, Point_ID), and emissions data for up to 15 annual pollutants and pollutant subspecies. Temporal data added to each record includes seasonal, daily and 24 hourly emissions percentages, and flags for emissions percentage offsets (e.g., the GMT resolution and Daylight Savings flags). The file is output in SAS format which is variable defined, and, therefore does not have fixed record positions. Output variable names and descriptions are given for module execution as depicted in System Charts.

Temporally Allocated Area Source Emissions File--

The TAM area source output contains area source location data (column and row) and temporally resolved emissions for up to 15 pollutant categories and pollutant subspecies. The file is output in SAS format. Variable names and descriptions are given for module flow as illustrated in the area source systems chart.

FILE NAME: Temporally Allocated Point Source Emissions File

RECORD NAME: Point Source Record

Page 1 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
N/A[a]				EISSCC	SCC Code
				STATE	AEROS State Code
				COUNTY	AEROS County Code
				PLANT_ID	Plant Identification Code
				POINT_ID	Point Identification Code
				AQCR	Air Quality Control Region
				EISSIC	SIC Code
				SOURCE	Source Type (='PS')
				LAT	Fractional Latitude (degrees)
				LON	Fractional Longitude (degrees)
				COL	Grid Column
				ROW	Grid Row
				SAF	Spatial Allocation Fraction (=1 for point sources)
				ZONE	Time Zone Flag[b]

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Maintain Time Zone
4 - Pacific Time Zone

FILE NAME: Temporally Allocated Point Source Emissions File

RECORD NAME: Point Source Record

Page 2 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				DAYLITE	Daylight Savings Flag[c]
				FLOW	Exhaust Gas Flow Rate (ft^3/min)
				PLUME_HT	Plume Height (ft)
				STACK-DI	Stack Diameter (ft)
				STACK-HT	Stack Height (ft)
				STACK_TP	Stack Temperature (°F)
				VELOCITY	Stack Gas Velocity (ft/min)
				REC_DATE	Record Date
				NUMPOLL	Number of Pollutants
				SAROAD	Pollutant SAROAD Codes
				EMISS	Pollutant Emissions (tons/yr)
				MAJOR	Major Pollutant Source Flag (=1)

NOTE: SAROAD and EMISS will be repeated NUMPOLL (up to 15) times, once for each pollutant.

				NUM_DAY	Number of Temporal Scenarios in Record
				SEA	Seasonal Temporal Allocation Factor
				DAY	Daily Temporal Allocation Factor

---

[c] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

FILE NAME: Temporally Allocated Point Source Emissions File RECORD NAME: Point Source Record

Page 2 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				HOUR1	Temporal Allocation Factor for Hour 1
				HOUR2	Temporal Allocation Factor for Hour 2
				HOUR3	Temporal Allocation Factor for Hour 3
				HOUR4	Temporal Allocation Factor for Hour 4
				HOUR5	Temporal Allocation Factor for Hour 5
				HOUR6	Temporal Allocation Factor for Hour 6
				HOUR7	Temporal Allocation Factor for Hour 7
				HOUR8	Temporal Allocation Factor for Hour 8
				HOUR9	Temporal Allocation Factor for Hour 9
				HOUR10	Temporal Allocation Factor for Hour 10
				HOUR11	Temporal Allocation Factor for Hour 11
				HOUR12	Temporal Allocation Factor for Hour 12
				HOUR13	Temporal Allocation Factor for Hour 13
				HOUR14	Temporal Allocation Factor for Hour 14
				HOUR15	Temporal Allocation Factor for Hour 15
				HOUR16	Temporal Allocation Factor for Hour 16
				HOUR17	Temporal Allocation Factor for Hour 17
				HOUR18	Temporal Allocation Factor for Hour 18
				HOUR19	Temporal Allocation Factor for Hour 19
				HOUR20	Temporal Allocation Factor for Hour 20

FILE NAME: Temporally Allocated Point Source Emissions File RECORD NAME: Point Source Record

Page 3 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				HOUR21	Temporal Allocation Factor for Hour 21
				HOUR22	Temporal Allocation Factor for Hour 22
				HOUR23	Temporal Allocation Factor for Hour 23
				HOUR24	Temporal Allocation Factor for Hour 24

NOTE: SEA, DAY AND HOUR1 to HOUR24 will be repeated 12 times, once for each temporal scenario. The variable HOUR may range from HOUR1 to HOUR288, where HOUR is in local time.

				CONEFF	Control Efficiency of Point Pollutant
				ESTMET	Estimation Method Used for Point Pollutant

NOTE: CONEFF AND ESTMET will be repeated NUMPOLL (up to 15) times, once for each pollutant.

FILE NAME: Temporally Allocated Area Source Emissions File (Version 5.2)

RECORD NAME: Area Source Record

Page 1 of 3

Record Position First	Last	Length	Format	Variable Name	Description
N/A[a]				COL	Grid Column
				ROW	Grid Row
				GMT	Hour (Greenwich Mean Time)
				TOT1	SO_2 Emissions (tons/hour)
				TOT2	SO_4 Emissions (tons/hour)
				TOT3	TSP Emissions (tons/hour)
				TOT4	Pb Emissions (tons/hour)
				TOT5	CO Emissions (tons/hour)
				TOT6	HCl Emissions (tons/hour)
				TOT7	HF Emissions (tons/hour)
				TOT8	NO_x Emissions (tons/hour)
				TOT9	NH_3 Emissions (tons/hour)
				TOT10	VOC Emissions (tons/hour)
				TOT11	Total HC Emissions (tons/hour)
				TOT12	Methane Emissions (moles/hour)
				TOT13	Ethane Emissions (moles/hour)
				TOT14	Propane Emissions (moles/hour)
				TOT15	n-Butane Emissions (moles/hour)

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name.

FILE NAME: Temporally Allocated Area Source Emissions File (Version 5.2)

RECORD NAME: Area Source Record

Record Position					
First	Last	Length	Format	Variable Name	Description
				TOT16	iso-Butane Emissions (moles/hour)
				TOT17	2,3-Dimethylbutane Emissions (moles/hour)
				TOT18	Pentane Emissions (moles/hour)
				TOT19	iso-Pentane Emissions (moles/hour)
				TOT20	Other Alkanes Emissions (moles/hour)
				TOT21	Ethylene Emissions (moles/hour)
				TOT22	Propylene Emissions (moles/hour)
				TOT23	(Not used)
				TOT24	iso-Butene Emissions (moles/hour)
				TOT25	trans-2-Butene Emissions (moles/hour)
				TOT26	Other Alkenes Emissions (moles/hour)
				TOT27	Benzene Emissions (moles/hour)
				TOT28	Toluene Emissions (moles/hour)
				TOT29	Xylene Emissions (moles/hour)
				TOT30	Ethyl Benzenes Emissions (moles/hour)
				TOT31	Other Aromatics Emissions (moles/hour)
				TOT32	Formaldehyde Emissions (moles/hour)
				TOT33	Acetaldehyde Emissions (moles/hour)
				TOT34	Propionaldehyde Emissions (moles/hour)
				TOT35	Other Aldehydes Emissions (moles/hour)
				TOT36	Acetone Emissions (moles/hour)

FILE NAME: Temporally Allocated Area Source Emissions File (Version 5.2)

RECORD NAME: Area Source Record

Page 3 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				TOT37	Other Ketones Emissions (moles/hour)
				TOT38	Formic Acid Emissions (moles/hour)
				TOT39	Acetic Acid Emissions (moles/hour)
				TOT40	Other Organic Acids Emissions (moles/hour)
				TOT41	NO Emissions (tons/hour)
				TOT42	NO_2 Emissions (tons/hour)

FILE NAME: Temporally Allocated Area Source Emissions File (Version 5.3)

RECORD NAME: Area Source Record

Page 1 of 2

Record Position				Variable Name	Description
First	Last	Length	Format		
N/A[a]				COL	Grid Column
				ROW	Grid Row
				GMT	Hour (Greenwich Mean Time)
				TOT1	SO_2 Emissions (tons/hour)
				TOT2	SO_4 Emissions (tons/hour)
				TOT3	TSP Emissions (tons/hour)
				TOT4	Pb Emissions (tons/hour)
				TOT5	CO Emissions (tons/hour
				TOT6	HCl Emissions (tons/hour)
				TOT7	HF Emissions (tons/hour)
				TOT8	NO_x Emissions (tons/hour)
				TOT9	NH_3 Emissions (tons/hour)
				TOT10	VOC Emissions (tons/hour)
				TOT11	Total HC Emissions (tons/hour)
				TOT12	Olefin Emissions (moles/hour)
				TOT13	Paraffin Emissions (moles/hour)
				TOT14	Toluene Emissions (moles/hour)
				TOT15	Xylene Emissions (moles/hour)
				TOT16	Formaldehyde Emissions (moles/hour)
				TOT17	Other Aldehyde Emissions (moles/hour)
				TOT18	Ethylene Emissions (moles/hour)
				TOT19	Nonreactive Emissions (moles/hour)

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name.

FILE NAME: Temporally Allocated Area Emissions File (Version 5.3)

RECORD NAME: Area Source Record

Page 2 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
				TOT20	Isoprene Emissions (moles/hour)
				TOT21	Methane Emissions (moles/hour)
				TOT22	NO Emissions (tons/hour)
				TOT23	NO_2 Emissions (tons/hour)

TAM Diagnostic Report

The diagnostic report documents the actions of the TAM. For both point and area sources, run date and time, title, and control options are always printed. A count of the emissions records processed is supplied in the SAS job log. If a detailed report is requested, temporal allocation factors merged into point and area source emission records are also printed. MTPREP.FORT does not generate a diagnostic report. Processing of this routine may be followed by checking the JES2 and SAS job logs. MTPREP.SAS generates a brief report, echoing the control options. Sample diagnostic reports for point and area source TAM runs using a subset of the NAPAP data base are given in Figures 4-3 and 4-4, respectively. Note: The MTPREP.SAS report is not included with the TAM area source report.

```
DATE: 15JUL87       TIME: 11:52:48                                                       TEMPORAL ALLOCATION MODULE (TAM)
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                                          DETAILED LISTING
DIAGNOSTIC REPORT                            1980 NAPAP 5.3 INVENTORY-POINT SOURCES USA
------------------------------------------------ CONTROL FILE LISTING ------------------------------------------------------

RUN IDENTIFICATION RECORD:
     SOURCE: PS  DETAIL: D  RUN ID: 1980 NAPAP 5.3 INVENTORY-POINT SOURCES USA
                                     NUMBER OF DAYS IN TEMPORAL ALLOCATION FILE: 12
                                                                                           11:50 WEDNESDAY, JULY 15, 1987
EMPLOYED TEMPORAL FACTORS

                  P   P
                  L   O    D N
   E         C    A   I    A U
   I     S   O    N   N    Y M                                                 S    S    S
   S     T   U    T   T  Z L _    S    S    S    S    S    S    S    S    S    E    E    E    D     D     D     D     D
   S     A   N    _   _  O I D    E    E    E    E    E    E    E    E    E    A    A    A    A     A     A     A     A
   C     T   T    I   I  N T A    A    A    A    A    A    A    A    A    A    1    1    1    Y     Y     Y     Y     Y
   C     E   Y    D   D  E E Y    1    2    3    4    5    6    7    8    9    0    1    2    1     2     3     4     5

10100202 01 0800 0010 01 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 0800 0010 02 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 0800 0010 03 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 0800 0010 04 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 0800 0010 05 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 0880 0001 03 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 1600 0001 01 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 1600 0001 02 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094
10100202 01 1920 0008 01 6 1 12 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .250 .0115 .0099 .0094 .0117 .0094

                  P   P
                  L   O
   E         C    A   I                                                                                           H    H
   I     S   O    N   N                            D     D     D     H    H    H    H    H    H    H    H    H    O    O
   S     T   U    T   T    D     D     D     D     A     A     A     O    O    O    O    O    O    O    O    O    U    U
   S     A   N    _   _    A     A     A     A     Y     Y     Y     U    U    U    U    U    U    U    U    U    R    R
   C     T   T    I   I    Y     Y     Y     Y     1     1     1     R    R    R    R    R    R    R    R    R    1    1
   C     E   Y    D   D    6     7     8     9     0     1     2     1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 0800 0010 02 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 0800 0010 03 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 0800 0010 04 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 0800 0010 05 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 0880 0001 03 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 1600 0001 01 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 1600 0001 02 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046
10100202 01 1920 0008 01 .0092 .0116 .0100 .0090 .0117 .0094 .0092 .035 .034 .033 .033 .033 .035 .038 .042 .045 .046 .046

                  P   P
                  L   O
   E         C    A   I    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
   I     S   O    N   N    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
   S     T   U    T   T    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
   S     A   N    _   _    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
   C     T   T    I   I    1    1    1    1    1    1    1    1    2    2    2    2    2    2    2    2    2    2    3    3
   C     E   Y    D   D    2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 0800 0010 02 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 0800 0010 03 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
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Figure 4-3. TAM sample "detailed" diagnostic report - point sources.

```
10100202 01 0800 0010 04 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 0800 0010 05 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 0880 0001 03 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 1600 0001 01 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 1600 0001 02 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
10100202 01 1920 0008 01 .046 .046 .045 .045 .045 .046 .047 .048 .047 .046 .044 .041 .038 .036 .033 .033 .033 .033 .033 .036
                                                                                                11:50 WEDNESDAY, JULY 15, 1987
EMPLOYED TEMPORAL FACTORS

                  P   P
                  L   O
   E         C    A   I   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
   I      S  O    N   N   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
   S      T  U    T   T   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
   S      A  N    _   _   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
   C      T  T    I   I   3    3    3    3    3    3    3    3    4    4    4    4    4    4    4    4    4    4    5    5
   C      E  Y    D   D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 0800 0010 02 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 0800 0010 03 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 0800 0010 04 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 0800 0010 05 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 0880 0001 03 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 1600 0001 01 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 1600 0001 02 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033
10100202 01 1920 0008 01 .039 .043 .047 .048 .048 .048 .045 .044 .044 .048 .051 .049 .047 .045 .043 .040 .036 .036 .034 .033

                  P   P
                  L   O
   E         C    A   I   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
   I      S  O    N   N   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
   S      T  U    T   T   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
   S      A  N    _   _   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
   C      T  T    I   I   5    5    5    5    5    5    5    5    6    6    6    6    6    6    6    6    6    6    7    7
   C      E  Y    D   D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 0800 0010 02 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 0800 0010 03 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 0800 0010 04 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 0800 0010 05 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 0880 0001 03 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 1600 0001 01 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 1600 0001 02 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043
10100202 01 1920 0008 01 .032 .032 .033 .035 .037 .040 .042 .044 .045 .046 .045 .044 .045 .048 .051 .051 .050 .048 .046 .043

                  P   P
                  L   O
   E         C    A   I   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
   I      S  O    N   N   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
   S      T  U    T   T   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
   S      A  N    _   _   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
   C      T  T    I   I   7    7    7    7    7    7    7    7    8    8    8    8    8    8    8    8    8    8    9    9
   C      E  Y    D   D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 0800 0010 02 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 0800 0010 03 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 0800 0010 04 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 0800 0010 05 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
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Figure 4-3. TAM sample "detailed" diagnostic report - point sources (continued).

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10100202 01 0880 0001 03 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 1600 0001 01 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 1600 0001 02 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
10100202 01 1920 0008 01 .039 .031 .030 .029 .029 .030 .032 .036 .043 .047 .049 .049 .049 .048 .048 .047 .046 .047 .047 .047
                                                                                                  11:50 WEDNESDAY, JULY 15, 1987
EMPLOYED TEMPORAL FACTORS

                  P   P
                  L   O                                           H    H    H    H    H    H    H    H    H    H    H    H
   E         C    A   I   H    H    H    H    H    H    H    H    O    O    O    O    O    O    O    O    O    O    O    O
   I     S   O    N   N   O    O    O    O    O    O    O    O    U    U    U    U    U    U    U    U    U    U    U    U
   S     T   U    T   T   U    U    U    U    U    U    U    U    R    R    R    R    R    R    R    R    R    R    R    R
   S     A   N    _   _   R    R    R    R    R    R    R    R    1    1    1    1    1    1    1    1    1    1    1    1
   C     T   T    I   I   9    9    9    9    9    9    9    9    0    0    0    0    0    0    0    0    0    0    1    1
   C     E   Y    D   D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 0800 0010 02 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 0800 0010 03 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 0800 0010 04 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 0800 0010 05 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 0880 0001 03 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 1600 0001 01 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 1600 0001 02 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045
10100202 01 1920 0008 01 .049 .048 .045 .040 .034 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048 .049 .047 .047 .045

                  P   P
                  L   O   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
   E         C    A   I   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
   I     S   O    N   N   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
   S     T   U    T   T   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
   S     A   N    _   _   1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
   C     T   T    I   I   1    1    1    1    1    1    1    1    2    2    2    2    2    2    2    2    2    2    3    3
   C     E   Y    D   D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 0800 0010 02 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 0800 0010 03 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 0800 0010 04 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 0800 0010 05 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 0880 0001 03 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 1600 0001 01 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 1600 0001 02 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044
10100202 01 1920 0008 01 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037 .040 .042 .044 .044

                  P   P
                  L   O   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
   E         C    A   I   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
   I     S   O    N   N   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
   S     T   U    T   T   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
   S     A   N    _   _   1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
   C     T   T    I   I   3    3    3    3    3    3    3    3    4    4    4    4    4    4    4    4    4    4    5    5
   C     E   Y    D   D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 0800 0010 02 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 0800 0010 03 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 0800 0010 04 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 0800 0010 05 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 0880 0001 03 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 1600 0001 01 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
```

Figure 4-3. TAM sample "detailed" diagnostic report - point sources (continued).

```
10100202 01 1600 0001 02 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
10100202 01 1920 0008 01 .045 .045 .044 .042 .041 .042 .043 .044 .047 .050 .048 .044 .039 .030 .029 .028 .028 .028 .031 .036
                                                                                                  11:50 WEDNESDAY, JULY 15, 1987
EMPLOYED TEMPORAL FACTORS

                  P   P
                  L   O    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
 E           C    A   I    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
 I       S   O    N   N    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
 S       T   U    T   T    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
 S       A   N    _   _    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 C       T   T    I   I    5    5    5    5    5    5    5    5    6    6    6    6    6    6    6    6    6    6    7    7
 C       E   Y    D   D    2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .042 .047 .049 .051 .051 .050 .051 .050 .050 050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 0800 0010 02 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 0800 0010 03 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 0800 0010 04 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 0800 0010 05 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 0880 0001 03 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 1600 0001 01 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 1600 0001 02 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033
10100202 01 1920 0008 01 .042 .047 .049 .051 .051 .050 .051 .050 .050 .050 .049 .047 .047 .047 .043 .037 .031 .038 .035 .033

                  P   P
                  L   O    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
 E           C    A   I    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
 I       S   O    N   N    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
 S       T   U    T   T    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
 S       A   N    _   _    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1    1
 C       T   T    I   I    7    7    7    7    7    7    7    7    8    8    8    8    8    8    8    8    8    8    9    9
 C       E   Y    D   D    2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 0800 0010 02 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 0800 0010 03 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 0800 0010 04 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 0800 0010 05 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 0880 0001 03 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 1600 0001 01 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 1600 0001 02 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042
10100202 01 1920 0008 01 .032 .031 .032 .033 .036 .041 .045 .048 .049 .049 .048 .047 .047 .047 .047 .046 .045 .046 .044 .042

                  P   P
                  L   O    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
 E           C    A   I    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
 I       S   O    N   N    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
 S       T   U    T   T    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
 S       A   N    _   _    1    1    1    1    1    1    1    1    2    2    2    2    2    2    2    2    2    2    2    2
 C       T   T    I   I    9    9    9    9    9    9    9    9    0    0    0    0    0    0    0    0    0    0    1    1
 C       E   Y    D   D    2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .048 .046 .046
10100202 01 0800 0010 02 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 0800 0010 03 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 0800 0010 04 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 0800 0010 05 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 0880 0001 03 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 1600 0001 01 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 1600 0001 02 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
10100202 01 1920 0008 01 .037 .039 .036 .034 .034 .033 .032 .032 .034 .038 .041 .045 .047 .048 .048 .047 .047 .046 .046 .046
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Figure 4-3. TAM sample "detailed" diagnostic report - point sources (continued).

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EMPLOYED TEMPORAL FACTORS                                                               11:50 WEDNESDAY, JULY 15, 1987

                  P    P
                  L    O   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
    E         C   A    I   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
    I     S   O   N    N   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
    S     T   U   T    T   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
    S     A   N   _    _   2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2
    C     T   T   I    I   1    1    1    1    1    1    1    1    2    2    2    2    2    2    2    2    2    2    3    3
    C     E   Y   D    D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 0800 0010 02 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 0800 0010 03 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 0800 0010 04 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 0800 0010 05 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 0880 0001 03 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 1600 0001 01 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 1600 0001 02 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046
10100202 01 1920 0008 01 .046 .048 .048 .045 .041 .031 .030 .030 .031 .033 .037 .043 .046 .048 .048 .048 .047 .047 .047 .046

                  P    P
                  L    O   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
    E         C   A    I   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
    I     S   O   N    N   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
    S     T   U   T    T   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
    S     A   N   _    _   2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2
    C     T   T   I    I   3    3    3    3    3    3    3    3    4    4    4    4    4    4    4    4    4    4    5    5
    C     E   Y   D    D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 0800 0010 02 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 0800 0010 03 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 0800 0010 04 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 0800 0010 05 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 0880 0001 03 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 1600 0001 01 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 1600 0001 02 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048
10100202 01 1920 0008 01 .046 .047 .048 .049 .048 .045 .040 .035 .030 .036 .034 .032 .031 .032 .032 .034 .038 .043 .047 .048

                  P    P
                  L    O   H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H    H
    E         C   A    I   O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O    O
    I     S   O   N    N   U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U    U
    S     T   U   T    T   R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R    R
    S     A   N   _    _   2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2    2
    C     T   T   I    I   5    5    5    5    5    5    5    5    6    6    6    6    6    6    6    6    6    6    7    7
    C     E   Y   D    D   2    3    4    5    6    7    8    9    0    1    2    3    4    5    6    7    8    9    0    1

10100202 01 0800 0010 01 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 0800 0010 02 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 0800 0010 03 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 0800 0010 04 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 0800 0010 05 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 0880 0001 03 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 1600 0001 01 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 1600 0001 02 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
10100202 01 1920 0008 01 .049 .047 .047 .045 .045 .046 .046 .046 .047 .048 .046 .043 .038 .039 .037 .036 .036 .036 .036 .037
1EMPLOYED TEMPORAL FACTORS                                                              11:50 WEDNESDAY, JULY 15, 1987
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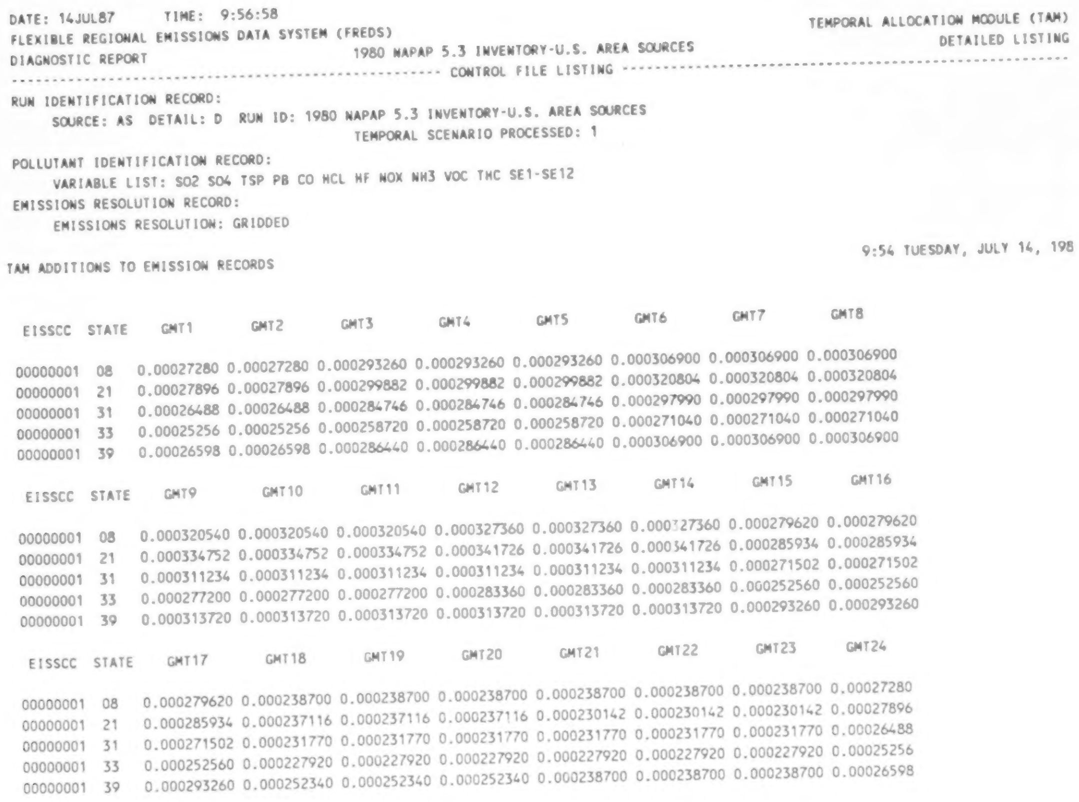
Figure 4-3. TAM sample "detailed" diagnostic report - point sources (continued).

EISSCC	STATE	COUNTY	PLANT_ID	POINT_ID	HOUR272	HOUR273	HOUR274	HOUR275	HOUR276	HOUR277	HOUR278	HOUR279	HOUR280	HOUR281	HOUR282	HOUR283	HOUR284	HOUR285	HOUR286	HOUR287	HOUR288
10100202	01	0800	0010	01	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	0800	0010	02	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	0800	0010	03	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	0800	0010	04	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	0800	0010	05	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	0880	0001	03	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	1600	0001	01	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	1600	0001	02	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039
10100202	01	1920	0008	01	.040	.042	.044	.044	.045	.045	.044	.042	.041	.042	.043	.044	.047	.050	.048	.044	.039

Figure 4-3. TAM sample "detailed" diagnostic report - point sources (continued).



```
DATE: 14JUL87      TIME:  9:56:58                                                                TEMPORAL ALLOCATION MODULE (TAM)
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                                                  DETAILED LISTING
DIAGNOSTIC REPORT                              1980 NAPAP 5.3 INVENTORY-U.S. AREA SOURCES
------------------------------------------------- CONTROL FILE LISTING -----------------------------------------------------------
RUN IDENTIFICATION RECORD:
     SOURCE: AS  DETAIL: D  RUN ID: 1980 NAPAP 5.3 INVENTORY-U.S. AREA SOURCES
                                           TEMPORAL SCENARIO PROCESSED: 1

POLLUTANT IDENTIFICATION RECORD:
     VARIABLE LIST: SO2 SO4 TSP PB CO HCL HF NOX NH3 VOC THC SE1-SE12
EMISSIONS RESOLUTION RECORD:
     EMISSIONS RESOLUTION: GRIDDED

                                                                                                9:54 TUESDAY, JULY 14, 198
TAM ADDITIONS TO EMISSION RECORDS


 EISSCC  STATE    GMT1        GMT2        GMT3        GMT4        GMT5        GMT6        GMT7        GMT8

00000001  08   0.00027280 0.00027280 0.000293260 0.000293260 0.000293260 0.000306900 0.000306900 0.000306900
00000001  21   0.00027896 0.00027896 0.000299882 0.000299882 0.000299882 0.000320804 0.000320804 0.000320804
00000001  31   0.00026488 0.00026488 0.000284746 0.000284746 0.000284746 0.000297990 0.000297990 0.000297990
00000001  33   0.00025256 0.00025256 0.000258720 0.000258720 0.000258720 0.000271040 0.000271040 0.000271040
00000001  39   0.00026598 0.00026598 0.000286440 0.000286440 0.000286440 0.000306900 0.000306900 0.000306900

 EISSCC  STATE    GMT9        GMT10       GMT11       GMT12       GMT13       GMT14       GMT15       GMT16

00000001  08   0.000320540 0.000320540 0.000320540 0.000327360 0.000327360 0.000327360 0.000279620 0.000279620
00000001  21   0.000334752 0.000334752 0.000334752 0.000341726 0.000341726 0.000341726 0.000285934 0.000285934
00000001  31   0.000311234 0.000311234 0.000311234 0.000311234 0.000311234 0.000311234 0.000271502 0.000271502
00000001  33   0.000277200 0.000277200 0.000277200 0.000283360 0.000283360 0.000283360 0.000252560 0.000252560
00000001  39   0.000313720 0.000313720 0.000313720 0.000313720 0.000313720 0.000313720 0.000293260 0.000293260

 EISSCC  STATE    GMT17       GMT18       GMT19       GMT20       GMT21       GMT22       GMT23       GMT24

00000001  08   0.000279620 0.000238700 0.000238700 0.000238700 0.000238700 0.000238700 0.000238700 0.00027280
00000001  21   0.000285934 0.000237116 0.000237116 0.000237116 0.000230142 0.000230142 0.000230142 0.00027896
00000001  31   0.000271502 0.000231770 0.000231770 0.000231770 0.000231770 0.000231770 0.000231770 0.00026488
00000001  33   0.000252560 0.000227920 0.000227920 0.000227920 0.000227920 0.000227920 0.000227920 0.00025256
00000001  39   0.000293260 0.000252340 0.000252340 0.000252340 0.000238700 0.000238700 0.000238700 0.00026598
```

Figure 4-4. TAM sample "detailed" diagnostic report - area sources.

SPECIATION MODULE

The Speciation Module can process emissions files output from any of the FREDS modules. This section presents descriptions of the files associated with the Speciation Module:

- SM Control Options File
- Speciation Factor File
- PSPLIT File
- Speciated Emissions Files

The report is:

- SM Diagnostic Report

SM Control Options File

The SM Control Options File contains flags and variables to control the operation of the Speciation Module. The formats of control records for point and area source processing are as follows:

FILE NAME: Speciation Control Options File

RECORD NAME: Run Identification Record - Point and Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=1)
3	4	2	A	SOURCE	Area or Point Source Identification (='PS', ='AS')
6	6	1	A	DETAIL	Level of Detail of the Diagnostic Report (='D', ='S', or for area sources only, ='T')
8	15	8	A	SASMEM	Member Name of SAS Input and Output Files
17	72	56	A	RUN_ID	Run Identification Header

FILE NAME: SM Control Options File RECORD NAME: Speciation File Format Record - Point Sources

Page 1 of 1

Record Position First	Record Position Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=2)
3	7	5	A	MAJCAT	SAROAD Codes of Major Pollutants to be Speciated[a]
9	10	2	N	NUM_SP	Number of Species in Each Pollutant Category (MAX=30)

Note: This record type may be repeated up to NUMPOLL times, where NUMPOLL is the number of annual pollutants.

[a] THC and NO_x speciation is not specified on the Speciation File Format record.

FILE NAME: SM Control Options File

RECORD NAME: Speciation File Format Record - Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=2)
3	10	8	A	MAJCAT	Names of Major Pollutants to be Speciated[a]
12	13	2	N	NUM_SP	Number of Species in Each Pollutant Category (MAX=30)

Note: This record type may be repeated up to NUMPOLL times, where NUMPOLL is the number of annual pollutants.

[a] Note SM requires "ATHC" and "ANO_x" to be specified first and second.

Speciation Factor File

This file contains the SAROAD codes for user-defined subclasses and the speciation factor for each subclass.

FILE NAME: Speciation Factor File RECORD NAME: Speciation Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	8	8	N	EISSCC	SCC Code
9	10	2	N	STATE	AEROS State Code
11	14	4	N	COUNTY	AEROS County Code
15	18	4	A	PLANT_ID	Plant Identification Code
19	21	3	A	POINT_ID	Point Identification Code
22	26	5	N	CLASS[a]	SAROAD[b] Codes for Subclasses
27	30	4	N	SF[a]	Speciation Factors for Each Subclass. Units are specified by the user (for 1980 processing, TSP speciation factors are dimensionless fractions).

---

[a] May be repeated up to 390 times (13 annual pollutants * 30 possible species per pollutant).

[b] A listing of SAROAD codes for 1980 NAPAP subclasses is given in Appendix F.

PSPLIT File

The PSPLIT file (currently) provides SAROAD codes and speciation factors for THC and NO_x subclasses.

FILE NAME: PSPLIT File

RECORD NAME: Header No. 1

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	5	5	N	CLASS1	SAROAD of THC Class No. 1
6	10	5	N	CLASS2	SAROAD of THC Class No. 2
11	15	5	N	CLASS3	SAROAD of THC Class No. 3
16	20	5	N	CLASS4	SAROAD of THC Class No. 4
21	25	5	N	CLASS5	SAROAD of THC Class No. 5
26	30	5	N	CLASS6	SAROAD of THC Class No. 6
31	35	5	N	CLASS7	SAROAD of THC Class No. 7
36	40	5	N	CLASS8	SAROAD of THC Class No. 8
41	45	5	N	CLASS9	SAROAD of THC Class No. 9
46	50	5	N	CLASS10	SAROAD of THC Class No. 10
51	55	5	N	CLASS11	SAROAD of THC Class No. 11
56	60	5	N	CLASS12	SAROAD of THC Class No. 12
61	65	5	N	CLASS13	SAROAD of THC Class No. 13
66	70	5	N	CLASS14	SAROAD of THC Class No. 14
71	75	5	N	CLASS15	SAROAD of THC Class No. 15
76	93	18	-	-	Unused
94	95	2	N	TYPE	Record Type (=11)

FILE NAME: PSPLIT File

RECORD NAME: Header No. 2

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	5	5	N	CLASS16	SAROAD of THC Class No. 16
6	10	5	N	CLASS17	SAROAD of THC Class No. 17
11	15	5	N	CLASS18	SAROAD of THC Class No. 18
16	20	5	N	CLASS19	SAROAD of THC Class No. 19
21	25	5	N	CLASS20	SAROAD of THC Class No. 20
26	30	5	N	CLASS21	SAROAD of THC Class No. 21
31	35	5	N	CLASS22	SAROAD of THC Class No. 22
36	40	5	N	CLASS23	SAROAD of THC Class No. 23
41	45	5	N	CLASS24	SAROAD of THC Class No. 24
46	50	5	N	CLASS25	SAROAD of THC Class No. 25
51	55	5	N	CLASS26	SAROAD of THC Class No. 26
56	60	5	N	CLASS27	SAROAD of THC Class No. 27
61	65	5	N	CLASS28	SAROAD of THC Class No. 28
66	70	5	N	CLASS29	SAROAD of THC Class No. 29
71	75	5	N	CLASS30	SAROAD of THC Class No. 30
76	93	18	-	-	Unused
94	95	2	N	TYPE	Record Type (=12)

FILE NAME: PSPLIT File RECORD NAME: Speciation Record No. 1

Page 1 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	STATE	AEROS State Code
3	6	4	N	COUNTY	AEROS County Code
7	10	4	A	PLANT_ID	Plant Identification Code
11	13	3	A	POINT_ID	Point Identification Code
14	21	8	N	EISSCC	SCC Code
22	25	4	N	SF1	Speciation Factor for THC Class No. 1 (moles/kg)
26	29	4	N	SF2	Speciation Factor for THC Class No. 2 (moles/kg)
30	33	4	N	SF3	Speciation Factor for THC Class No. 3 (moles/kg)
34	37	4	N	SF4	Speciation Factor for THC Class No. 4 (moles/kg)
38	41	4	N	SF5	Speciation Factor for THC Class No. 5 (moles/kg)
42	45	4	N	SF6	Speciation Factor for THC Class No. 6 (moles/kg)
46	49	4	N	SF7	Speciation Factor for THC Class No. 7 (moles/kg)
50	53	4	N	SF8	Speciation Factor for THC Class No. 8 (moles/kg)
54	57	4	N	SF9	Speciation Factor for THC Class No. 9 (moles/kg)
58	61	4	N	SF10	Speciation Factor for THC Class No. 10 (moles/kg)
62	65	4	N	SF11	Speciation Factor for THC Class No. 11 (moles/kg)

FILE NAME: PSPLIT File

RECORD NAME: Speciation Record No. 1

Page 2 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
66	69	4	N	SF12	Speciation Factor for THC Class No. 12 (moles/kg)
70	73	4	N	SF13	Speciation Factor for THC Class No. 13 (moles/kg)
74	77	4	N	SF14	Speciation Factor for THC Class No. 14 (moles/kg)
78	81	4	N	SF15	Speciation Factor for THC Class No. 15 (moles/kg)
82	85	4	N	HCHOWT	HC Adjustment for Aldehyde and Methane (dimensionless weight fraction)
86	89	4	N	SF31	Speciation Factor for NO (dimensionless weight fraction)
90	93	4	N	SF32	Speciation Factor for NO_2 (dimensionless weight fraction)
94	95	2	N	TYPE	Record Type (=21)

NOTE: For Version 5.3, speciation factors for NO and NO_2 are the variables SF11 and SF12, respectively.

FILE NAME: PSPLIT File RECORD NAME: Speciation Record No. 2

Page 1 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	STATE	AEROS State Code
3	6	4	N	COUNTY	AEROS County Code
7	10	4	A	PLANT_ID	Plant Identification Code
11	13	3	A	POINT_ID	Point Identification Code
14	21	8	N	EISSCC	SCC Code
22	25	4	N	SF16	Speciation Factor for THC Class No. 16 (moles/kg)
26	29	4	N	SF17	Speciation Factor for THC Class No. 17 (moles/kg)
30	33	4	N	SF18	Speciation Factor for THC Class No. 18 (moles/kg)
34	37	4	N	SF19	Speciation Factor for THC Class No. 19 (moles/kg)
38	41	4	N	SF20	Speciation Factor for THC Class No. 20 (moles/kg)
42	45	4	N	SF21	Speciation Factor for THC Class No. 21 (moles/kg)
46	49	4	N	SF22	Speciation Factor for THC Class No. 22 (moles/kg)
50	53	4	N	SF23	Speciation Factor for THC Class No. 23 (moles/kg)
54	57	4	N	SF24	Speciation Factor for THC Class No. 24 (moles/kg)
58	61	4	N	SF25	Speciation Factor for THC Class No. 25 (moles/kg)
62	65	4	N	SF26	Speciation Factor for THC Class No. 26 (moles/kg)

FILE NAME: PSPLIT File

RECORD NAME: Speciation Record No. 2

Page 2 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
66	69	4	N	SF27	Speciation Factor for THC Class No. 27 (moles/kg)
70	73	4	N	SF28	Speciation Factor for THC Class No. 28 (moles/kg)
74	77	4	N	SF29	Speciation Factor for THC Class No. 29 (moles/kg)
78	81	4	N	SF30	Speciation Factor for THC Class No. 30 (moles/kg)
82	93	12	-	-	Unused
94	95	2	N	TYPE	Record Type (=22)

Speciated Emissions Files

Speciated Point Source Emissions File--

The Speciated Point Source Emissions File contains plant and point location data (latitude, longitude, Plant_ ID and Point_ ID), emissions for up to 15 annual pollutants (tons/yr), and speciation factors (moles/kg, dimensionless fractions) for pollutant subspecies. If the Temporal Allocation or Spatial Allocation Modules have been executed prior to SM, temporal and/or spatial factors will be included on the emissions records. The file is output in SAS format--variable defined with no fixed record positions. File format and variable descriptions for a speciated, temporally and spatially resolved point source file follow.

Speciated Area Source Emissions File--

The Speciated Area Source Emissions File contains area source location data (state, county) and speciated emissions for up to 15 pollutants (tons/yr) and subspecies (moles/yr, tons/yr). The total number of subspecies is specified in the Control Options File and supplied in the PSPLIT File and Speciation Factor File. The speciated emissions are output in SAS format. The output file description for module execution as depicted in System Charts follows.

FILE NAME: Speciated Point Source File (Version 5.2 or Version 5.3)

RECORD NAME: Point Source Record

Page 1 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
N/A[a]				EISSCC	SCC Code
				STATE	AEROS State Code
				COUNTY	AEROS County Code
				PLANT_ID	Plant Identification Code
				POINT_ID	Point Identification Code
				AQCR	Air Quality Control Region
				EISSIC	SIC Code
				SOURCE	Source Type (='PS')
				LAT	Fractional Latitude (degrees)
				LON	Fractional Longitude (degrees)
				COL	Grid Column
				ROW	Grid Row
				SAF	Spatial Allocation Fraction (=1 for point sources)
				ZONE	Time Zone Flag[b]
				DAYLITE	Daylight Savings Flag[c]

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

[c] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

FILE NAME: Speciated Point Source File
(Version 5.2 or Version 5.3)

RECORD NAME: Point Source Record

Page 2 of 4

Record Position				Variable Name	Description
First	Last	Length	Format		
				FLOW	Exhaust Gas Flow Rate (ft^3/min)
				PLUME_HT	Plume Height (ft)
				STACK-DI	Stack Diameter (ft)
				STACK_HT	Stack Height (ft)
				STACK_TP	Stack Temperature (F)
				VELOCITY	Stack Gas Velocity (ft/min)
				HCHOWT	Adelhyde and Methane Speciation Adjustment
				REC_DATE	Year of Emission Record
				NUMPOLL	Number of Pollutants
				SAROAD	Pollutant SAROAD Code
				EMISS	Pollutant Emissions (tons/yr)
				MAJOR	Major Pollutant Source Flag (=1)

NOTE: SAROAD and EMISS will be repeated NUMPOLL (up to 15) times, once for each pollutant.

				NUM_DAY	Number of Temporal Factor Sets in Record
				SEA	Seasonal Temporal Allocation Factor
				DAY	Daily Temporal Allocation Factor
				HOUR1	Temporal Allocation Factor for Hour 1
				HOUR2	Temporal Allocation Factor for Hour 2
				HOUR3	Temporal Allocation Factor for Hour 3

FILE NAME: Speciated Point Source File
(Version 5.2 or Version 5.3)

RECORD NAME: Point Source Record

Page 3 of 4

Record Position				Variable Name	Description
First	Last	Length	Format		
				HOUR4	Temporal Allocation Factor for Hour 4
				HOUR5	Temporal Allocation Factor for Hour 5
				HOUR6	Temporal Allocation Factor for Hour 6
				HOUR7	Temporal Allocation Factor for Hour 7
				HOUR8	Temporal Allocation Factor for Hour 8
				HOUR9	Temporal Allocation Factor for Hour 9
				HOUR10	Temporal Allocation Factor for Hour 10
				HOUR11	Temporal Allocation Factor for Hour 11
				HOUR12	Temporal Allocation Factor for Hour 12
				HOUR13	Temporal Allocation Factor for Hour 13
				HOUR14	Temporal Allocation Factor for Hour 14
				HOUR15	Temporal Allocation Factor for Hour 15
				HOUR16	Temporal Allocation Factor for Hour 16
				HOUR17	Temporal Allocation Factor for Hour 17
				HOUR18	Temporal Allocation Factor for Hour 18
				HOUR19	Temporal Allocation Factor for Hour 19
				HOUR20	Temporal Allocation Factor for Hour 20
				HOUR21	Temporal Allocation Factor for Hour 21
				HOUR22	Temporal Allocation Factor for Hour 22

NOTE: SEA, DAY AND HOUR1 to HOUR24 will be repeated 12 times, once for each temporal scenario. The variable HOUR may range from HOUR1 to HOUR288, where HOUR is in local time.

FILE NAME: Speciated Point Source File (Version 5.2 or Version 5.3)

RECORD NAME: Point Source Record

Page 4 of 4

Record Position				Variable Name	Description
First	Last	Length	Format		
				HOUR23	Temporal Allocation Factor for Hour 23
				HOUR24	Temporal Allocation Factor for Hour 24
				NUMSP	Number of Speciation Factors
				CAT	Major Pollutant SAROAD of Species
				CLASS	SAROAD Code of Pollutant Subspecies
				SF	Speciation Factor of Species.

NOTE: CAT, CLASS and SF will be repeated 37 times for Version 5.2 and 17 times for Version 5.3, once for each species. In addition, for Version 5.2 SF represents factors divided by 100 (e.g. to arrive at speciated emissions SF must be multiplied by 100).

Record Position				Variable Name	Description
First	Last	Length	Format		
				CONEFF	Control Efficiency of Point Pollutant
				ESTMET	Estimation Method Used for Point Pollutant

NOTE: CONEFF and ESTMET will be repeated NUMPOLL (up to 15) times, once for each pollutant.

FILE NAME: Speciated Area Source File (Version 5.2)

RECORD NAME: Area Source Record

Page 1 of 3

Record Position First	Last	Length	Format	Variable Name	Description
N/A[a]				STATE	AEROS State Code
				COUNTY	AEROS County Code
				EISSCC	"Pseudo" SCC Code
				DAYLITE	Daylight Savings Indicator[b] for GMT offset and temporal processing
				ZONE	Time Zone Flag[c]
				ASO_2	SO_2 Emissions (tons/yr)
				ASO_4	SO_4 Emissions (tons/yr)
				ATSP	TSP Emissions (tons/yr)
				APB	PB Emissions (tons/yr)
				ACO	CO Emissions (tons/yr)
				AHCL	HCL Emissions (tons/yr)
				AHF	HF Emissions (tons/yr)

---

[a] SAS Files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

[c] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

FILE NAME: Speciated Area Source File (Version 5.2)

RECORD NAME: Area Source Record

Page 2 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				ANO_x	NO_x Emissions (tons/yr)
				ANH_3	NH_3 Emissions (tons/yr)
				AVOC	VOC Emissions (tons/yr)
				ATHC	THC Emissions (tons/yr)
				SF1	Methane Emissions (moles/yr)
				SF2	Ethane Emissions (moles/yr)
				SF3	Propane Emissions (moles/yr)
				SF4	n-Butane Emissions (moles/yr)
				SF5	iso-Butane Emissions (moles/yr)
				SF6	2,3-Dimethylbutane Emissions (moles/yr)
				SF7	Pentane Emissions (moles/yr)
				SF8	iso-Pentane Emissions (moles/yr)
				SF9	Other Alkanes Emissions (moles/yr)
				SF10	Ethylene Emissions (moles/yr)
				SF11	Propylene Emissions (moles/yr)
				SF12	Not Used
				SF13	iso-Butene Emissions (moles/yr)
				SF14	trans-2-Butene Emissions (moles/yr)
				SF15	Other Alkenes Emissions (moles/yr)
				SF16	Benzene Emissions (moles/yr)
				SF17	Toluene Emissions (moles/yr)
				SF18	Xylene Emissions (moles/yr)

FILE NAME: Speciated Area Source File (Version 5.2)

RECORD NAME: Area Source Record

Page 3 of 3

Record Position				Variable Name	Description
First	Last	Length	Format		
				SF19	Ethyl Benzenes Emissions (moles/yr)
				SF20	Other Aromatics Emissions (moles/yr)
				SF21	Formaldehyde Emissions (moles/yr)
				SF22	Acetaldehyde Emissions (moles/yr)
				SF23	Propionaldehyde Emissions (moles/yr)
				SF24	Other Aldehydes Emissions (moles/yr)
				SF25	Acetone Emissions (moles/yr)
				SF26	Other Ketones Emissions (moles/yr)
				SF27	Formic Acid Emissions (moles/yr)
				SF28	Acetic Acid Emissions (moles/yr)
				SF29	Other Organic Acids Emissions (moles/yr)
				SF30	NO Emissions (tons/yr)
				SF31	NO_2 Emissions (tons/yr)

FILE NAME: Speciated Area Source File (Version 5.3) RECORD NAME: Area Source Record

Page 1 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
N/A[a]				STATE	AEROS State Code
				COUNTY	AEROS County Code
				EISSCC	"Pseudo" SCC Code
				DAYLITE	Daylight Savings Indicator[b] for GMT offset and temporal processing
				ZONE	Time Zone Flag[c]
				ASO_2	SO_2 Emissions (tons/yr)
				ASO_4	SO_4 Emissions (tons/yr)
				ATSP	TSP Emissions (tons/yr)
				APB	PB Emissions (tons/yr)
				ACO	CO Emissions (tons/yr)
				AHCL	HCL Emissions (tons/yr)
				AHF	HF Emissions (tons/yr)

---

[a] SAS Files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

[c] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

FILE NAME: Speciated Area Source File
(Version 5.3)

RECORD NAME: Area Source Record

Page 2 of 2

Record Position				Variable Name	Description
First	Last	Length	Format		
				ANO_x	NO_x Emissions (tons/yr)
				ANH_3	NH_3 Emissions (tons/yr)
				AVOC	VOC Emissions (tons/yr)
				ATHC	THC Emissions (tons/yr)
				SF1	Olefin Emissions (moles/yr)
				SF2	Paraffin Emissions (moles/yr)
				SF3	Toluene Emissions (moles/yr)
				SF4	Xylene Emissions (moles/yr)
				SF5	Formaldehyde Emissions (moles/yr)
				SF6	Other Aldehydes Emissions (moles/yr)
				SF7	Ethylene Emissions (moles/yr)
				SF8	Nonreactive Emissions (moles/yr)
				SF9	Isoprene Emissions (moles/yr)
				SF10	Methane Emissions (moles/yr)
				SF11	NO Emissions (tons/yr)
				SF12	NO_2 Emissions (tons/yr)

SM Diagnostic Report

The Speciation Module diagnostic report contains the run date and time and, a control options listing including the pollutants to be speciated and the subspecies for each major category. If a detailed listing is requested, speciation factors for point sources will be printed. For area sources, a listing of speciated emissions will be printed. If requested, speciated emissions sums will also be printed for area source emissions. Sample diagnostic reports for point and area source runs are illustrated in Figures 4-5 and 4-6 for a subset of the 1980 NAPAP data base.

```
DATE: 15JUL87      TIME: 16:22:37                                                              SPECIATION MODULE (SM)
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                                      DETAILED LISTING
DIAGNOSTIC REPORT                      1980 NAPAP 5.3 INVENTORY - U.S. POINT SOURCES
                                                        ------------------------------------------------------------
--------------------------------------------- CONTROL FILE LISTING ---------------------------------------------------

RUN IDENTIFICATION RECORD:
      SCE: PS  DETAIL: D  SAS FILE: DATA RUN ID: 1980 NAPAP 5.3 INVENTORY - U.S. POINT SOURCES

SPECIATION FACTOR FILE DEFINITION RECORDS:
                                                 MAJOR
                                               POLLUTANT    # OF
                                  RECORD #      SAROAD   SUBCLASSES
                                  ---------------------------------
                                     1          11101        5
                                  ---------------------------------

                                                                                         16:12 WEDNESDAY, JULY 15, 198

EMPLOYED SPECIATION FACTORS

                  P   P
                  L   O
   E         C    A   I       H
   I      S  O    N   N  N    C                                                           C     C     C     C     C     C
   S      T  U    T   T  U    H     C     C     C     C     C     C     C     C     C     A     A     A     A     A     A
   S      A  N    _   _  M    O     A     A     A     A     A     A     A     A     A     T     T     T     T     T     T
   C      T  T    I   I  S    W     T     T     T     T     T     T     T     T     T     1     1     1     1     1     1
   C      E  Y    D   D  P    T     1     2     3     4     5     6     7     8     9     0     1     2     3     4     5

10100202 01 0800 0010 01 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 0800 0010 02 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 0800 0010 03 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 0800 0010 04 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 0800 0010 05 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 0880 0001 03 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 1600 0001 01 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 1600 0001 02 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101
10100202 01 1920 0008 01 37 .0000 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101

                  P   P
                  L   O
   E         C    A   I
   I      S  O    N   N    C     C     C     C     C     C     C     C     C     C     C     C     C     C     C     C     C
   S      T  U    T   T    A     A     A     A     A     A     A     A     A     A     A     A     A     A     A     A     A
   S      A  N    _   _    T     T     T     T     T     T     T     T     T     T     T     T     T     T     T     T     T
   C      T  T    I   I    1     1     1     1     2     2     2     2     2     2     2     2     2     2     3     3     3
   C      E  Y    D   D    6     7     8     9     0     1     2     3     4     5     6     7     8     9     0     1     2

10100202 01 0800 0010 01 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 0800 0010 02 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 0800 0010 03 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 0800 0010 04 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 0800 0010 05 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 0880 0001 03 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 1600 0001 01 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 1600 0001 02 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602
10100202 01 1920 0008 01 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 43101 42602 42602

                  P   P                                                                                         C   C C C C C C
                  L   O                                                                                         L   L L L L L L
                  A   I                                  C     C     C     C     C     C     C     C     C     A   A A A A A A
   E         C                                           L     L     L     L     L     L     L     L     L
   I      S  O    N   N    C     C     C     C     C
```

Figure 4-5. SM sample "detailed" diagnostic report - point sources.

```
  S      T   U    T   T    A     A     A     A     A     A     A     A     A     A     A     A     A     A     S   S S S S S S
  S      A   N    _   _    T     T     T     T     T     S     S     S     S     S     S     S     S     S     S   S S S S S S
  C      T   T    I   I    3     3     3     3     3     S     S     S     S     S     S     S     S     S     1   1 1 1 1 1 1
  C      E   Y    D   D    3     4     5     6     7     1     2     3     4     5     6     7     8     9     0   1 2 3 4 5 6

10100202 01 0800 0010 01 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 0800 0010 02 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 0800 0010 03 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 0800 0010 04 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 0800 0010 05 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 0880 0001 03 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 1600 0001 01 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 1600 0001 02 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
10100202 01 1920 0008 01 11101 11101 11101 11101 11101 43298 43199 45202 45102 43502 43511 43203 43899 43243 43201 . . . . . .
EMPLOYED SPECIATION FACTORS                                                                           16:12 WEDNESDAY, JULY 15, 198

                  P   P
                  L   O  C C C C C C C C C C C C C C   C     C     C     C     C     C     C
  E          C    A   I  L L L L L L L L L L L L L L   L     L     L     L     L     L     L
  I      S   O    N   N  A A A A A A A A A A A A A A   A     A     A     A     A     A     A
  S      T   U    T   T  S S S S S S S S S S S S S S   S     S     S     S     S     S     S
  S      A   N    _   _  S S S S S S S S S S S S S S   S     S     S     S     S     S     S     S     S     S     S     S
  C      T   T    I   I  1 1 1 2 2 2 2 2 2 2 2 2 2 3   3     3     3     3     3     3     3     F     F     F     F     F
  C      E   Y    D   D  7 8 9 0 1 2 3 4 5 6 7 8 9 0   1     2     3     4     5     6     7     1     2     3     4     5

10100202 01 0800 0010 01 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 0800 0010 02 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 0800 0010 03 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 0800 0010 04 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 0800 0010 05 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 0880 0001 03 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 1600 0001 01 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 1600 0001 02 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000
10100202 01 1920 0008 01 . . . . . . . . . . . . . . 42601 42602 12111 12140 12184 12180 19999 .0122 .2095 .0167 .0451 .0000

                  P   P
                  L   O
  E          C    A   I
  I      S   O    N   N
  S      T   U    T   T                            S     S     S     S     S     S     S     S     S     S     S     S     S
  S      A   N    _   _    S     S     S     S     F     F     F     F     F     F     F     F     F     F     F     F     F
  C      T   T    I   I    F     F     F     F     1     1     1     1     1     1     1     1     1     1     2     2     2
  C      E   Y    D   D    6     7     8     9     0     1     2     3     4     5     6     7     8     9     0     1     2

10100202 01 0800 0010 01 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 0800 0010 02 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 0800 0010 03 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 0800 0010 04 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 0800 0010 05 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 0880 0001 03 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 1600 0001 01 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 1600 0001 02 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000
10100202 01 1920 0008 01 .0030 .0000 .0172 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000

                  P   P
                  L   O
  E          C    A   I
  I      S   O    N   N
  S      T   U    T   T    S     S     S     S     S     S     S     S     S     S   S     S     S     S     S
```

Figure 4-5. SM sample "detailed" diagnostic report - point sources (continued).

```
                           F     F     F     F     F     F     F     F     F     F     F     F     F     F     F
   S      A  N    _   _    2     2     2     2     2     2     2     3     3     3     3     3     3     3     3
   C      T  T    I   I    3     4     5     6     7     8     9     0     1     2     3     4     5     6     7
   C      E  Y    D   D

10100202 01 0800 0010 01 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 0800 0010 02 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 0800 0010 03 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 0800 0010 04 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 0800 0010 05 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 0880 0001 03 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 1600 0001 01 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 1600 0001 02 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
10100202 01 1920 0008 01 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .0000 .9700 .0300 .0162 .0171 .0082 .0044 .9541
```

Figure 4-5. SM sample "detailed" diagnostic report - point sources (continued).

```
DATE: 14JUL87      TIME: 12:13:46                                                              SPECIATION MODULE (SM)
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                                     TOTAL    LISTING
DIAGNOSTIC REPORT                        1980 NAPAP 5.3 INVENTORY - U.S. AREA SOURCES
-------------------------------------------------- CONTROL FILE LISTING -----------------------------------------------------

RUN IDENTIFICATION RECORD:
     SOURCE: AS  DETAIL: T  SAS FILE: DATA RUN ID: 1980 NAPAP 5.3 INVENTORY - U.S. AREA SOURCES

POLLUTANT SPECIES DEFINITION RECORDS:
                                                   MAJOR      # OF
                                      RECORD #  POLLUTANT   SPECIES
                                      ---------------------------
                                         1        ATHC        10
                                         2        ANOX         2
                                      ---------------------------

                                              SPECIE DESCRIPTIONS
                                SF    POLLUTANT                  POLLUTANT
                              NUMBER   SAROAD                   DESCRIPTION
                              ----------------------------------------------------
                                 1     43298    OLEFINS
                                 2     43199    PARAFFINS
                                 3     45202    TOLUENE
                                 4     45102    XYLENE
                                 5     43502    FORMALDEHYDE
                                 6     43511    OTHER ALDEHYDES
                                 7     43203    ETHYLENE
                                 8     43899    NON-REACTIVES
                                 9     43243    ISOPRENE
                                10     43201    METHANE
                                11     42601    NO
                                12     42602    NO2                                     12:11 TUESDAY, JULY 14, 1987
ANNUAL TOTALS OF SPECIATED EMISSIONS
 VARIABLE          SUM

 SF1           3502212874
 SF2         120343154645
 SF3           3149031363
 SF4           3287491185
 SF5           2887968648
 SF6           4930080990
 SF7           4812192665
 SF8           9639432947
 SF9                    0
 SF10          8682974128
 SF11             1725784
 SF12              165733
```

Figure 4-6. SM sample "totals" diagnostic report - area sources.

SPATIAL ALLOCATION MODULE

This section describes the files accessed by the Spatial Allocation Module. The SAM accepts SAS formatted emissions files output from any of the FREDS modules. The following files are input or created by the SAM:

- SAM Control Options File
- Spatial Allocation Factor File (Area Sources)
- Spatially Allocated Emissions Files

The report is:

- SAM Diagnostic Report

SAM Control Options File

Control options for the SAM are specified in card image format. There are two record types for point sources: Run Identification and Grid Specification. These records are input for area sources as well as the Subfile Definition and Pollutant List records. The SAM distinguishes between record types by a record identification field located in the first column of each record.

The Run Identification record informs the SAM of the source file type to be processed and the level of output detail, and assigns the module run an identification label. Only one Run Identification record may be specified per COF. The Grid Specification record provides information concerning the dimensions of the grid system including boundaries and increments. Only one record per run may be included.

The Subfile Definition record tells SAM the first and last record numbers of the area source emissions subfile being processed. This limits the number of area source records processed in a single run to 1 million.

The Pollutant List records consist of input and output variable names for pollutants being processed. This allows for multiplication of emissions and their corresponding spatial allocation factors. The format of each control option record is listed on the following pages.

FILE NAME: SAM Control Options File RECORD NAME: Run Identification Record - Point and Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=1)
3	4	2	A	SOURCE	Source Type to be Input (='PS', ='AS')
6	6	1	A	DETAIL	Level of detail of the Diagnostic Report (='S', ='D', and for area sources only, ='T')
8	15	8	A	SASMEM	Member name of SAS Input and Output Files
17	72	56	A	RUN_ID	Run Identification Header

FILE NAME: SAM Control Options File

RECORD NAME: Grid Specification Record - Point and Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=2)
3	4	2	N	SLAT	Southernmost Latitude of Grid (degrees)
6	7	2	N	NLAT	Northernmost Latitude of Grid (degrees)
9	10	2	N	ILAT	Number of Grids Per Degree of Latitude
12	14	3	N	WLON	Westernmost Longitude of Grid (degrees)
16	18	3	N	ELON	Easternmost Longitude of Grid (degrees)
20	21	2	N	ILON	Number of Grids Per Degree of Longitude

FILE NAME: SAM Control Options File

RECORD NAME: Subfile Definition Record - Area Sources

Page 1 of 1

Record Position		Length	Format	Variable Name	Description
First	Last				
1	1	1	N	TYPE	Record Identification (=3)
3	9	7	N	FIRST	Emission Record Number of First Area Source Subfile Record Processed
11	17	7	N	LAST	Emission Record Number of Last Area Source Subfile Record Processed

FILE NAME: SAM Control Options File RECORD NAME: Pollutant List Record - Area Sources

Page 1 of 1

Record Position: Line 1

First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Record Identification (=4)
3	72	70	A	LIST	Input Pollutant Variable Names[a]

Record Position: Line 1

First	Last	Length	Format	Variable Name	Description
3	72	70	A	LISTS	Output Pollutant Variable Names[b]

---

[a] For 1980 NAPAP area source processing, the input pollutant variable names are defined as follows: ASO_2, ASO_4, ATSP, APB, ACO, AHCL, AHF, ANO_x, ANH_3, AVOC, ATHC, SF1-SF31 (for version 5.2; for version 5.3, SF31 becomes SF12). The order and names are user defined when each module is executed.

[b] The output pollutant variable list order corresponds to the input format. For 1980 processing, the output pollutant variable list is as follows: SO_2, SO_4, TSP, PB, CO, HCL, HF, NO_x, NH_3, VOC, THC, SE1-SE31 (or SE1-SE12).

Spatial Allocation Factor File

The spatial allocation factors are produced by peripheral software originally designed for the Regional Model Data Handling System (RMDHS). Up to 30 allocation factors (surrogates) can be created by this software. Surrogate selections can be made on the county-specific, state-specific, or global level. Only 160 grids per county, state, or global group may be specified. The Spatial Allocation Factor File has one record type. Each record contains all of the spatial allocation information for a particular SCC code in a specific county. The detailed format is on the following page. Spatial allocation factor development and processing has been documented in "Development of the 1980 NAPAP Emissions Inventory,"[1] "National Acid Precipitation Assessment Program Emission Inventory Allocation Factors,"[2] and "Documentation of Spatial Allocation Procedures for the 1980 NAPAP Emissions Inventory."[3]

FILE NAME: Spatial Allocation Factor File

RECORD NAME: Spatial Allocation Factor Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	2	2	N	STATE	AEROS State Code
3	6	4	N	COUNTY	AEROS County Code
7	9	3	N	EISSCC	SCC Code
10	12	3	N	NGRID	Number of Grids in County
13	16	4	N	NROW	Row of Grid Cell
17	20	4	N	NCOL	Column of Grid Cell
21	24	4	N	NSAF	Spatial Allocation Factor for Grid Cell[a]

NOTE: Columns 13-24 are repeated up to NGRID times.

[a] Spatial allocation factors are dimensionless fractions representing the portion of a county's land use for a specific land use category in a grid cell.

Spatially Allocated Emissions Files

Spatially Allocated Point Source File--

The Spatially Allocated Point Source File contains identification and location data, emissions for up to 15 annual pollutants (tons/yr), and a spatial allocation factor equal to 1 for each emission record. In addition, temporal and speciation factors may also be present if TAM and/or SM were executed prior to the SAM. The file is output in SAS format--variable defined with no fixed record positions. The output file and variable definitions for the module execution specified in System Charts follow.

Spatially Allocated Area Source File--

The Spatially Allocated Area Source Emissions File contains area source location data and spatially allocated emissions for up to 15 major pollutant categories. If the speciation module has been executed prior to the SAM, spatially resolved emissions for a user-specified number of subspecies will also be present. If hourly emissions are input to SAM, the output will contain spatially resolved hourly emissions. The output file(s) are SAS formatted; the variable descriptions based on module execution specified in System Charts for area sources follows.

FILE NAME: Spatially Allocated Point Source Emissions File

RECORD NAME: Point Source Record

Page 1 of 3

Record Position:

First	Last	Length	Format	Variable Name	Description
N/A[a]				STATE	AEROS State Code
				COUNTY	AEROS County Code
				AQCR	Air Quality Control Region
				PLANT_ID	Plant Identification Code
				POINT_ID	Point Identification Code
				REC_DATE	Record Date
				UTM_ZONE	UTM Zone
				UTMX	UTM Horizontal Coordinate
				UTMY	UTM Vertical Coordinate
				LAT	Fractional Latitude (degrees)
				LON	Fractional Longitude (degrees)
				COL	Grid Column
				ROW	Grid Row
				SAF	Spatial Allocation Fraction (=1 for point sources)
				EISSIC	SIC Code
				EISSCC	SCC Code
				SOURCE	Source Type (='PS')
				THRU_WIN	Winter Throughput Percent
				THRU_SPR	Spring Throughput Percent
				THRU_SUM	Summer Throughput Percent

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name.

FILE NAME: Spatially Allocated Point Source Emissions File

RECORD NAME: Point Source Record

Page 2 of 3

Record Position:					
First	Last	Length	Format	Variable Name	Description
				THRU_FAL	Fall Throughput Percent
				HOURS	Hours per Day
				DAYS	Days per Week
				WEEKS	Weeks per Year
				NUMPOLL	Number of Pollutants
				SAROAD1	Pollutant ID 1
				EMISS1	Emissions for SAROAD 1 (tons/yr)
				SAROAD2	Pollutant ID 2
				EMISS2	Emissions for SAROAD 2 (tons/yr)
				SAROAD3	Pollutant ID 3
				EMISS3	Emissions for SAROAD 3 (tons/yr)
				SAROAD4	Pollutant ID 4
				EMISS4	Emissions for SAROAD 4 (tons/yr)
				SAROAD5	Pollutant ID 5
				EMISS5	Emissions for SAROAD 5 (tons/yr)
				SAROAD6	Pollutant ID 6
				EMISS6	Emissions for SAROAD 6 (tons/yr)
				SAROAD7	Pollutant ID 7
				EMISS7	Emissions for SAROAD 7 (tons/yr)
				SAROAD8	Pollutant ID 8
				EMISS8	Emissions for SAROAD 8 (tons/yr)
				SAROAD9	Pollutant ID 9
				EMISS9	Emissions for SAROAD 9 (tons/yr)

FILE NAME: Spatially Allocated Point Source Emissions File

RECORD NAME: Point Source Record

Page 3 of 3

Record Position: First	Last	Length	Format	Variable Name	Description
				SAROAD10	Pollutant ID 10
				EMISS10	Emissions for SAROAD 10 (tons/yr)
				SAROAD11	Pollutant ID 11
				EMISS11	Emissions for SAROAD 11 (tons/yr)
				SAROAD12	Pollutant ID 12
				EMISS12	Emissions for SAROAD 12 (tons/yr)
				SAROAD13	Pollutant ID 13
				EMISS13	Emissions for SAROAD 13 (tons/yr)
				SAROAD14	Pollutant ID 14
				EMISS14	Emissions for SAROAD 14 (tons/yr)
				SAROAD15	Pollutant ID 15
				EMISS15	Emissions for SAROAD 15 (tons/yr)
				PLUME_HT	Plume Height (ft)
				STACK_TP	Stack Temperature (°F)
				STACK_HT	Stack Height (ft)
				STACK_DI	Stack Diameter (ft)
				FLOW	Exhaust Flow Rate (ft^3/min)
				VELOCITY	Exit Velocity (ft/min)
				MAJOR	Major Point Source Flag (=1)
				CONEFF	Estimated Control Efficiency (%)

NOTE: CONEFF and ESTMET will be repeated NUMPOLL (up to 15) times, once for each pollutant.

FILE NAME: Spatially Allocated Area Source Emissions File (Version 5.2)

RECORD NAME: Area Source Record

Page 1 of 3

Record Position:

First	Last	Length	Format	Variable Name	Description
N/A[a]				STATE	AEROS State Code
				COUNTY	AEROS County Code
				EISSCC	"Pseudo" SCC Code
				DAYLITE	Daylight Savings Indicator[b] for GMT offset and temporal processing
				ZONE	Time Zone Flag[c]
				COL	Grid Column
				ROW	Grid Row
				SO_2	SO_2 Emissions (tons/yr)
				SO_4	SO_4 Emissions (tons/yr)
				TSP	TSP Emissions (tons/yr)
				PB	PB Emissions (tons/yr)

---

[a] SAS Files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

[c] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

FILE NAME: Spatially Allocated Area Source File (Version 5.2)

RECORD NAME: Area Source Record

Page 2 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				CO	CO Emissions (tons/yr)
				HCL	HCL Emissions (tons/yr)
				HF	HF Emissions (tons/yr)
				NO_x	NO_x Emissions (tons/yr)
				NH_3	NH_3 Emissions (tons/yr)
				VOC	VOC Emissions (tons/yr)
				THC	THC Emissions (tons/yr)
				SE1	Methane Emissions (moles/yr)
				SE2	Ethane Emissions (moles/yr)
				SE3	Propane Emissions (moles/yr)
				SE4	n-Butane Emissions (moles/yr)
				SE5	iso-Butane Emissions (moles/yr)
				SE6	2,3-Dimethylbutane Emissions (moles/yr)
				SE7	Pentane Emissions (moles/yr)
				SE8	iso-Pentane Emissions (moles/yr)
				SE9	Other Alkanes Emissions (moles/yr)
				SE10	Ethylene Emissions (moles/yr)
				SE11	Propylene Emissions (moles/yr)
				SE12	Not Used
				SE13	iso-Butene Emissions (moles/yr)
				SE14	trans-2-Butene Emissions (moles/yr)
				SE15	Other Alkenes Emissions (moles/yr)
				SE16	Benzene Emissions (moles/yr)

FILE NAME: Spatially Allocated Area Source File (Version 5.2)

RECORD NAME: Area Source Record

Page 3 of 3

Record Position					
First	Last	Length	Format	Variable Name	Description
				SE17	Toluene Emissions (moles/yr)
				SE18	Xylene Emissions (moles/yr)
				SE19	Ethyl Benzenes Emissions (moles/yr)
				SE20	Other Aromatics Emissions (moles/yr)
				SE21	Formaldehyde Emissions (moles/yr)
				SE22	Acetaldehyde Emissions (moles/yr)
				SE23	Propionaldehyde Emissions (moles/yr)
				SE24	Other Aldehydes Emissions (moles/yr)
				SE25	Acetone Emissions (moles/yr)
				SE26	Other Ketones Emissions (moles/yr)
				SE27	Formic Acid Emissions (moles/yr
				SE28	Acetic Acid Emissions (moles/yr)
				SE29	Other Organic Acids Emissions (moles/yr)
				SE30	NO Emissions (tons/yr)
				SE31	NO_2 Emissions (tons/yr)

FILE NAME: Spatially Allocated Area Source File (Version 5.3)

RECORD NAME: Area Source Record

Page 1 of 2

Record Position First	Record Position Last	Length	Format	Variable Name	Description
N/A[a]				STATE	Aeros State Code
				COUNTY	Aeros County Code
				EISSCC	"Pseudo" SCC Code
				DAYLITE	Daylight Savings Indicator[b] for GMT offset and temporal processing
				ZONE	Time Zone Flag[c]
				COL	Grid Column
				ROW	Grid Row
				SO_2	SO_2 Emissions (tons/yr)
				SO_4	SO_4 Emissions (tons/yr)
				TSP	TSP Emissions (tons/yr)
				PB	PB Emissions (tons/yr)

---

[a] SAS Files are variable defined and, thus, variables in SAS data sets are referenced by name.

[b] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

[c] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

FILE NAME: Spatially Allocated Area Source File (Version 5.3)

RECORD NAME: Area Source Record

Page 2 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
				CO	CO Emissions (tons/yr)
				HCL	HCL Emissions (tons/yr)
				HF	HF Emissions (tons/yr)
				NO_x	NO_x Emissions (tons/yr)
				NH_3	NH_3 Emissions (tons/yr)
				VOC	VOC Emissions (tons/yr)
				THC	THC Emissions (tons/yr)
				SE1	Olefin Emissions (moles/yr)
				SE2	Paraffin Emissions (moles/yr)
				SE3	Toluene Emissions (moles/yr)
				SE4	Xylene Emissions (moles/yr)
				SE5	Formaldehyde Emissions (moles/yr)
				SE6	Other Aldehydes Emissions (moles/yr)
				SE7	Ethylene Emissions (moles/yr)
				SE8	Nonreactive Emissions (moles/yr)
				SE9	Isoprene Emissions (moles/yr)
				SE10	Methane Emissions (moles/yr)
				SE11	NO Emissions (tons/yr)
				SE12	NO_2 Emissions (tons/yr)

SAM Diagnostic Report

The Spatial Allocation Module diagnostic report includes run date and time, a control options listing including the number of rows, columns, and grid cells, and the number of input records processed. If a detailed listing is requested by the user in the Control Options File, the output will include a listing of the location of every point source by grid cell address. For area sources, the spatially allocated emissions will be listed. Area source summary listings containing emission totals may also be requested. Processing and error messages are contained in all reports. Sample reports for point and area source processing using a subset of the 1980 NAPAP inventory are presented in Figures 4-7 and 4-8.

```
DATE: 15JUL87      TIME: 11:43:17
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                     SPATIAL ALLOCATION MODULE (SAM)
DIAGNOSTIC REPORT                            NAPAP 5.2 INVENTORY-POINT SOURCES USA                  DETAILED LISTING
-------------------------------------------------- CONTROL FILE LISTING -------------------------------------------------
RUN IDENTIFICATION RECORD:
     SOURCE: PS  DETAIL: D  SAS FILE: DATA  RUN ID: NAPAP 5.2 INVENTORY-POINT SOURCES USA

GRID DEFINITION RECORD:
                          NORTH LATITUDE: 60                                    WEST LONGITUDE: 125
                          SOUTH LATITUDE: 25                                    EAST LONGITUDE:  50
                                                 GRIDS PER DEGREE LATITUDE:  6
                                                GRIDS PER DEGREE LONGITUDE:  4
                                                           NUMBER OF ROWS:     210
                                                        NUMBER OF COLUMNS:     300
                                                          NUMBER OF GRIDS:   63000

                                                                                        11:42 WEDNESDAY, JULY 15, 198
GRID LOCATIONS OF EMISSION RECORDS

 EISSCC  STATE COUNTY PLANT_ID POINT_ID   LAT     LON    COL ROW
10100202  01    0800    0010      01    34.7439 87.8486 149 59
10100202  01    0800    0010      02    34.7439 87.8486 149 59
10100202  01    0800    0010      03    34.7439 87.8486 149 59
10100202  01    0800    0010      04    34.7439 87.8486 149 59
10100202  01    0800    0010      05    34.7439 87.8486 149 59
10100202  01    0880    0001      03    31.4097 86.3728 155 39
10100202  01    1600    0001      01    32.6014 87.7864 149 46
10100202  01    1600    0001      02    32.6014 87.7864 149 46
10100202  01    1920    0008      01    34.8839 85.7544 157 60
10100202  01    1920    0008      02    34.8839 85.7544 157 60
10100202  01    1920    0008      03    34.8839 85.7544 157 60
10100202  01    1920    0008      04    34.8839 85.7544 157 60
10100202  01    1920    0008      05    34.8839 85.7544 157 60
10100202  01    1920    0008      06    34.8839 85.7544 157 60
10100202  01    1980    P001      01    33.5628 86.8911 153 52
10100204  01    0880    0001      01    31.4097 86.3728 155 39
10100204  01    0880    0001      02    31.4097 86.3728 155 39
10100212  01    1200    0002      01    34.0131 85.9731 157 55
10100212  01    1200    0002      02    34.0131 85.9731 157 55
10100212  01    1920    0008      07    34.8839 85.7544 157 60
10100212  01    1920    0008      08    34.8839 85.7544 157 60
10100501  01    0800    0010      05    34.7439 87.8486 149 59
10100501  01    1920    0008      01    34.8839 85.7544 157 60
10100501  01    1920    0008      02    34.8839 85.7544 157 60
10100501  01    1920    0008      03    34.8839 85.7544 157 60
10100501  01    1920    0008      04    34.8839 85.7544 157 60
10100501  01    1920    0008      05    34.8839 85.7544 157 60
10100501  01    1920    0008      06    34.8839 85.7544 157 60
10100501  01    1920    0008      07    34.8839 85.7544 157 60
10100501  01    1920    0008      08    34.8839 85.7544 157 60
10100604  01    1200    0002      01    34.0131 85.9731 157 55
10100604  01    1200    0002      02    34.0131 85.9731 157 55
10200201  01    1980    0350      16    33.5600 86.8103 153 52
10200201  01    1980    0350      17    33.5600 86.8103 153 52
10200201  01    1980    0350      18    33.5600 86.8103 153 52
10200202  01    1980    0350      19    33.5600 86.8103 153 52
```

Figure 4-7. SAM sample "detailed" diagnostic report - point sources.

```
10200202  01   1980   0350    20   33.5600 86.8103 153 52
10200202  01   1980   0370    62   33.5600 86.8900 153 52
10200202  01   1980   0370    64   33.5600 86.8900 153 52
10200202  01   1980   0370    65   33.5600 86.8900 153 52
10200204  01   0580   0004    06   32.8622 85.1883 160 48
10200204  01   0680   0001    15   32.2236 88.0186 148 44
10200204  01   0680   0001    16   32.2236 88.0186 148 44
10200205  01   0580   0006    08   32.7928 85.1844 160 47
10200205  01   0580   0006    09   32.7928 85.1844 160 47
10200401  01   0680   0001    17   32.2236 88.0186 148 44
10200401  01   0680   0001    19   32.1022 87.9536 149 43
10200401  01   0720   0001    07   31.4947 87.8906 149 39
10200401  01   0720   0001    08   31.4947 87.8906 149 39
10200401  01   1180   0001    11   31.0756 87.1100 152 37
10200401  01   1180   0001    12   31.0756 87.1100 152 37
10200401  01   1200   0006    02   34.0114 85.9786 157 55
10200401  01   1920   0014    01   34.8653 85.7867 157 60
10200401  01   1980   0370    59   33.5600 86.8900 153 52
10200401  01   1980   0370    60   33.5600 86.8900 153 52
```

Figure 4-7. SAM sample "detailed" diagnostic report - point sources (continued).

```
DATE: 14JUL87      TIME: 16:21:23                                                                 SPATIAL ALLOCATION MODULE (SAM)
FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                                                  SUMMARY  LISTING
DIAGNOSTIC REPORT                          1980 NAPAP 5.3 INVENTORY -- U.S. AREA SOURCES
------------------------------------------------- CONTROL FILE LISTING ----------------------------------------------------

RUN IDENTIFICATION RECORD:
     SOURCE: AS  DETAIL: T  SAS FILE: DATA  RUN ID: 1980 NAPAP 5.3 INVENTORY -- U.S. AREA SOURCES

 GRID DEFINITION RECORD:                                                           WEST LONGITUDE: 125
                         NORTH LATITUDE: 60                                        EAST LONGITUDE:  50
                         SOUTH LATITUDE: 25
                                              GRIDS PER DEGREE LATITUDE:  6
                                             GRIDS PER DEGREE LONGITUDE:  4
                                                         NUMBER OF ROWS:      210
                                                      NUMBER OF COLUMNS:      300
                                                        NUMBER OF GRIDS:    63000

 SUBFILE DEFINITION RECORD:
      LAST RECORD:     1000000
     FIRST RECORD:           1
    --------------------------
     TOTAL RECORDS:    1000000

 POLLUTANT DEFINITION RECORD
     VARIABLE LIST: ASO2 ASO4 ATSP APB ACO AHCL AHF ANOX ANH3 AVOC ATHC SF1-SF12
                    SO2 SO4 TSP PB CO HCL HF NOX NH3 VOC THC SE1-SE12
SPATIALLY ALLOCATED EMISSIONS                                                                   15:54 TUESDAY, JULY 14, 1987
 VARIABLE          SUM
 SO2            41013.1
 SO4             5506.6
 TSP           224259.6
 PB               534.5
 CO           1999911.3
 HCL               90.8
 HF                34.5
 NOX           214690.7
 NH3             2422.9
 VOC           385005.1
 THC           405817.1
 SE1        416536267.8
 SE2      13412622891.4
 SE3        333101518.2
 SE4        264768519.9
 SE5        339572416.0
 SE6        573085717.8
 SE7        552499072.3
 SE8       1120757702.1
 SE9                0.0
 SE10      1013845603.7
 SE11          195619.6
 SE12           19071.2
```

Figure 4-8. SAM sample "totals" diagnostic report - area sources.

MODEL INPUT PREPROCESSOR

This section presents descriptions of the files associated with the MIP and the report generated by it. These files are as follows:

- MIP Control Options File
- Emissions Files or Subfiles
- SAS-EBCDIC Control Options File
- Modeler's Tapes (SAS and EBCDIC)

The report is:

- MIP Diagnostic Report

MIP Control Options File

The MIP Control Options File is composed of three record types for area source processing: the Run Identification record, the Pollutant Variable List record, and the Resolution record. For point source processing, only the Run Identification record is required.

The Run Identification record contains the run identification header, the level of detail for the diagnostic report, the source type (AS or PS), and the number of subfiles being combined. The Pollutant List record contains the names of area source pollutant variables for output. The Resolution record instructs MIP to process gridded or nongridded area source emissions.

FILE NAME: MIP Control Options File

RECORD NAME: Run Identification Record - Point and Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control File Record Type (=1)
3	3	1	N	INNUM	Number of Input Files to be Combined
5	5	1	A	DETAIL	Level of Detail for Diagnostic Report (='S', for area sources only, ='T')
7	8	2	A	SOURCE	Source Type ('AS' or 'PS')
10	71	62	A	RUN_ID	Run Identification Header

FILE NAME: MIP Control Options File RECORD NAME: Pollutant Variable List Record - Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control File Record Type (=2)
3	72	70	A	VARLIST	List of Pollutant Variables for Output[a]

---

[a] For 1980 NAPAP area source processing, the pollutant variable list is TOT1-TOT42 for Version 5.2 and TOT1-TOT23 for Version 5.3, where the pollutants corresponding to each TOT variable are prespecified by the user in earlier modules. The pollutants corresponding to the TOT variables for 1980 processing are defined with the MIP output file.

FILE NAME: MIP Control Options File RECORD NAME: Resolution Record - Area Sources

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	1	1	N	TYPE	Control Options Record Type (=3)
3	12	10	A	EMRES	Level of Resolution of input emissions data (='gridded' or ='nongridded')[a]

---

[a] Gridded refers to spatially allocated emissions (resolved by column and row). Nongridded refers to county level emissions (by SCC, State, County).

Emissions Files

The Model Input Preprocessor (MIP) can accept as input any emissions file produced by the following FREDS system modules: Model Data Extraction Module (MDEM), Temporal Allocation Module (TAM), Speciation Module (SM), and Spatial Allocation Module (SAM). The formats of the files produced by the above modules have been described in the Input/Output Format discussion of the respective modules and will not be repeated here. For point source processing as illustrated in Section 2, the input format corresponds to the speciation module output emissions file described earlier. For area source runs, the input format for MIP corresponds to the TAM output file.

Modeler's Tapes

The output of MIP is a Modeler's Tape containing speciated and spatially and temporally allocated emissions. MIP output differs significantly for point and area sources.

Point Source Modeler's Tape--

The point source Modeler's Tape contains annual emissions totals and spatial, temporal, and species allocation factors which can be multiplied together to produce gridded, speciated emissions for a typical weekday, Saturday, and Sunday in each season. Resolution of the point source Modeler's Tapes into speciated, hourly, gridded emissions requires multiplication of annual emissions by their respective factors. Sample SAS programs to resolve Version 5.2 and 5.3 point source emissions are supplied with the Detailed Program Description for the Model Input Preprocessor.

Area Source Modeler's Tapes--

Due to the large number of area source records, a separate Modeler's Tape is generated for each of the 12 temporal scenarios. Each tape contains 24 gridded or nongridded, hourly, speciated emissions totals for each source record. The SAS and EBCDIC formats for these files follow. Note for county level processing, the variables COL and ROW in the first eight fields will be replaced by EISSCC, State and County, which would occupy the first 14 fields.

SAS-EBCDIC Contol Options File

The SAS-EBCDIC Control Options File contains the inventory version number (5.2 or 5.3) for point source processing. This defines the array for the number of pollutants to be written to EBCDIC. For area sources, the control file defines the number of pollutants and the level of resolution (COL, ROW, or EISSCC, STATE, COUNTY) of the emissions file to be written to EBCDIC.

FILE NAME: SAS-EBCDIC Control Options File

RECORD NAME: Point Source Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	3	3	A	VERSION	Enter inventory version number (='5.2' or ='5.3')

FILE NAME: SAS-EBCDIC Control Options File

RECORD NAME: Area Source Record

Page 1 of 1

Record Position					
First	Last	Length	Format	Variable Name	Description
1	3	3	N	NUMPOLL	Number of Pollutants
5	14	10	A	EMRES	Resolution of emissions file (='gridded' or ='nongridded')

FILE NAME: Point Source Modeler's Tape Versions 5.2 and 5.3, SAS, and EBCDIC

RECORD NAME: Emissions Record

Page 1 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
1	8	8	N	EISSCC	SCC Code[b]
9	10	2	N	STATE	AEROS State Code
11	14	4	N	COUNTY	AEROS County Code
15	18	4	A	PLANT_ID	Plant Identification Code
19	20	2	A	POINT_ID	Point Identification Code
21	24	4	N	AQCR	Air Quality Control Region
25	28	4	N	EISSIC	SIC Code
29	30	2	A	SOURCE	Source Type (='PS')
31	40	10	N	LAT	Fractional Latitude (degrees)
41	50	10	N	LON	Fractional Longitude (degrees)
51	54	4	N	COL	Grid Column
55	58	4	N	ROW	Grid Row
59	59	1	N	ZCNE	Time Zone Flag[c]

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name. Record positions refer to the EBCDIC Modeler's Tape.

[b] A listing of point source SCC codes is given in Appendix F.

[c] For Time Zone Flag:
1 - Eastern Time Zone
2 - Central Time Zone
3 - Mountain Time Zone
4 - Pacific Time Zone

FILE NAME: Point Source Modeler's Tape
Versions 5.2 and 5.3, SAS
and EBCDIC

RECORD NAME: Emissions Record

Page 2 of 5

Record Position First	Record Position Last	Length	Format	Variable Name	Description
60	60	1	N	DAYLITE	Daylight Savings Flag[d]
61	67	7	N	FLOW	Exhaust Gas Flow Rate (ft^3/min)
68	71	4	N	PLUME_HT	Plume Height (ft)
72	75	4	N	STACK_DI	Stack Diameter (ft)
76	79	4	N	STACK_HT	Stack Height (ft)
80	83	4	N	STACK_TP	Stack Temperature (°F)
84	88	5	N	VELOCITY	Stack Gas Velocity (ft/sec)
89	93	5	N	HCHOWT	Aldehyde and Methane Speciation Adjustment (dimensionless weight fraction)
94	95	2	N	REC_DATE	Year of Emission Record
96	97	2	N	NUMPOLL	Number of Pollutants (maximum=15)
98		5	N	SAROAD	Pollutant SAROAD Code
		7	N	EMISS	Pollutant Emissions (tons/year)

NOTE: SAROAD and EMISS will be repeated NUMPOLL (up to 15) times, once for each pollutant.

Record Position First	Record Position Last	Length	Format	Variable Name	Description
		2	N	NUM_DAY	Number of Temporal Factor Sets in Record
		4	N	SEA	Seasonal Temporal Allocation Factor
		5	N	DAY	Daily Temporal Allocation Factor

---

[d] 0 - No, Daylight Savings Time is not adhered to in this area.
1 - Yes, Daylight Savings Time is adhered to in this area.

FILE NAME: Point Source Modeler's Tape Versions 5.2 and 5.3, SAS and EBCDIC

RECORD NAME: Emissions Record

Page 3 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
		4	N	HOUR1[e]	Temporal Allocation Factor for Hour 1
		4.	N	HOUR2	Temporal Allocation Factor for Hour 2
		4	N	HOUR3	Temporal Allocation Factor for Hour 3
		4	N	HOUR4	Temporal Allocation Factor for Hour 4
		4	N	HOUR5	Temporal Allocation Factor for Hour 5
		4	N	HOUR6	Temporal Allocation Factor for Hour 6
		4	N	HOUR7	Temporal Allocation Factor for Hour 7
		4	N	HOUR8	Temporal Allocation Factor for Hour 8
		4	N	HOUR9	Temporal Allocation Factor for Hour 9
		4	N	HOUR10	Temporal Allocation Factor for Hour 10
		4	N	HOUR11	Temporal Allocation Factor for Hour 11
		4	N	HOUR12	Temporal Allocation Factor for Hour 12
		4	N	HOUR13	Temporal Allocation Factor for Hour 13
		4	N	HOUR14	Temporal Allocation Factor for Hour 14
		4	N	HOUR15	Temporal Allocation Factor for Hour 15
		4	N	HOUR16	Temporal Allocation Factor for Hour 16
		4	N	HOUR17	Temporal Allocation Factor for Hour 17
		4	N	HOUR18	Temporal Allocation Factor for Hour 18
		4	N	HOUR19	Temporal Allocation Factor for Hour 19
		4	N	HOUR20	Temporal Allocation Factor for Hour 20

---

[e] Hour1 is defined as 0000-0100 GMT.

FILE NAME: Point Source Modeler's Tape
Versions 5.2 and 5.3, SAS
and EBCDIC

RECORD NAME: Emissions Record

Page 4 of 5

Record Position First	Last	Length	Format	Variable Name	Description
		4	N	HOUR21	Temporal Allocation Factor for Hour 21
		4	N	HOUR22	Temporal Allocation Factor for Hour 22
		4	N	HOUR23	Temporal Allocation Factor for Hour 23
		4	N	HOUR24	Temporal Allocation Factor for Hour 24

NOTE: SEA, DAY and HOUR1 to HOUR24 may be repeated 12 times, once for each temporal scenario. The variable HOUR may range from Hour1 to Hour288, where HOUR is in local time.

Record Position First	Last	Length	Format	Variable Name	Description
		3	N	NUMSP	Number of Speciation Factors
		5	N	CAT	Major Pollutant SAROAD of Species
		5	N	CLASS	SAROAD Code of Pollutant Species
		5	N	SF	Speciation Factor of Species (moles/kg)

NOTE: CAT, CLASS and SF will be repeated once for each species, 37 times, for Version 5.2 and 17 times for Version 5.3. For version 5.2 SF represents factors divided by 100 (e.g., to arrive at speciated emissions SF must be multiplied by 100).

FILE NAME: Point Source Modeler's Tape Versions 5.2 and 5.3, SAS and EBCDIC

RECORD NAME: Emissions Record

Page 5 of 5

Record Position					
First	Last	Length	Format	Variable Name	Description
		4	N	CONEFF	Control Efficiency of Point Pollutant (%)
		1	N	ESTMET	Estimation Method Used for Point Pollutant[e]

NOTE: CONEFF and ESTMET will be repeated NUMPOLL (up to 15) times, once for each pollutant.

NOTE: Two additional variables are included in the SAS formatted output tapes:

MAJOR	Major Pollutant Source Flag (=1)
SAF	Spatial Allocation Fraction (=1 for point sources)

---

[e] A listing of point source estimation methods is given in Appendix F.

FILE NAME: Area Source Modeler's Tape Version 5.2, SAS[a] and EBCDIC

RECORD NAME: Emissions Record

Page 1 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
1	4	4	N	COL	Grid Column
5	8	4	N	ROW	Grid Row
9	10	2	N	GMT	Hour (Greenwich Mean Time)
11	20	10	N	TOT1	Resolved Emissions for SO_2 (tons/hr)
21	30	10	N	TOT2	Resolved Emissions for SO_4 (tons/hr)
31	40	10	N	TOT3	Resolved Emissions for TSP (tons/hr)
41	50	10	N	TOT4	Resolved Emissions for Pb (tons/hr)
51	60	10	N	TOT5	Resolved Emissions for CO (tons/hr)
61	70	10	N	TOT6	Resolved Emissions for HCL (tons/hr)
71	80	10	N	TOT7	Resolved Emissions for HF (tons/hr)
81	90	10	N	TOT8	Resolved Emissions for NO_x (tons/hr)
91	100	10	N	TOT9	Resolved Emissions for NH_3 (tons/hr)
101	110	10	N	TOT10	Resolved Emissions for VOC (tons/hr)

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name. Record positions refer to the EBCDIC Modeler's Tape.

FILE NAME: Area Source Modeler's Tape
Version 5.2, SAS and EBCDIC

RECORD NAME: Emissions Record

Page 2 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
111	120	10	N	TOT11	Resolved Emissions for THC (tons/hr)
121	130	10	N	TOT12	Resolved Emissions for Methane (moles/hr)
131	140	10	N	TOT13	Resolved Emissions for Ethane (moles/hr)
141	150	10	N	TOT14	Resolved Emissions for Propane (moles/hr)
151	160	10	N	TOT15	Resolved Emissions for n-Butane (moles/hr)
161	170	10	N	TOT16	Resolved Emissions for iso-Butane (moles/hr)
171	180	10	N	TOT17	Resolved Emissions for 2,3-Dimethylbutane (moles/hr)
181	190	10	N	TOT18	Resolved Emissions for Pentane (moles/hr)
191	200	10	N	TOT19	Resolved Emissions for iso-Pentane (moles/hr)
201	210	10	N	TOT20	Resolved Emissions for Other Alkanes (moles/hr)
211	220	10	N	TOT21	Resolved Emissions for Ethylene (moles/hr)
221	230	10	N	TOT22	Resolved Emissions for Propylene (moles/hr)
231	240	10	N	TOT23	Not Used
241	250	10	N	TOT24	Resolved Emissions for iso-Butene (moles/hr)

FILE NAME: Area Source Modeler's Tape
Version 5.2, SAS and EBCDIC

RECORD NAME: Emissions Record

Page 3 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
251	260	10	N	TOT25	Resolved Emissions for trans-2-Butene (moles/hr)
261	270	10	N	TOT26	Resolved Emissions for Other Alkenes (moles/hr)
271	280	10	N	TOT27	Resolved Emissions for Benzene (moles/hr)
281	290	10	N	TOT28	Resolved Emissions for Toluene (moles/hr)
291	300	10	N	TOT29	Resolved Emissions for Xylenes (moles/hr)
301	310	10	N	TOT30	Resolved Emissions for Ethyl Benzenes (moles/hr)
311	320	10	N	TOT31	Resolved Emissions for Other Aromatics (moles/hr)
321	330	10	N	TOT32	Resolved Emissions for Formaldehyde (moles/hr)
331	340	10	N	TOT33	Resolved Emissions for Acetaldehyde (moles/hr)
341	350	10	N	TOT34	Resolved Emissions for Propionaldehyde (moles/hr)
351	360	10	N	TOT35	Resolved Emissions for Other Aldehydes (moles/hr)
361	370	10	N	TOT36	Resolved Emissions for Acetone (moles/hr)
371	380	10	N	TOT37	Resolved Emissions for Other Ketones (moles/hr)
381	390	10	N	TOT38	Resolved Emissions for Formic Acid (moles/hr)

FILE NAME: Area Source Modeler's Tape
Version 5.2, SAS and EBCDIC

RECORD NAME: Emissions Record

Page 4 of 4

Record Position					
First	Last	Length	Format	Variable Name	Description
391	400	10	N	TOT39	Resolved Emissions for Acetic Acid (moles/hr)
401	410	10	N	TOT40	Resolved Emissions for Other Organic Acids (moles/hr)
411	420	10	N	TOT41	Resolved Emissions for NO (tons/hr)
421	430	10	N	TOT42	Resolved Emissions for NO_2 (tons/hr)

FILE NAME: Area Source Modeler's Tape
Version 5.3, SAS[a] and EBCDIC

RECORD NAME: Emissions Record

Page 1 of 2

Record Position					
First	Last	Length	Format	Variable Name	Description
1	4	4	N	COL	Grid Column
5	8	4	N	ROW	Grid Row
9	10	2	N	GMT	Hour (Greenwich Mean Time)
11	20	10	N	TOT1	Resolved Emissions for SO_2 (tons/hr)
21	30	10	N	TOT2	Resolved Emissions for SO_4 (tons/hr)
31	40	10	N	TOT3	Resolved Emissions for TSP (tons/hr)
41	50	10	N	TOT4	Resolved Emissions for Pb (tons/hr)
51	60	10	N	TOT5	Resolved Emissions for CO (tons/hr)
61	70	10	N	TOT6	Resolved Emissions for HCL (tons/hr)
71	80	10	N	TOT7	Resolved Emissions for HF (tons/hr)
81	90	10	N	TOT8	Resolved Emissions for NO_x (tons/hr)
91	100	10	N	TOT9	Resolved Emissions for NH_3 (tons/hr)
101	110	10	N	TOT10	Resolved Emissions for VOC (tons/hr)

---

[a] SAS files are variable defined and, thus, variables in SAS data sets are referenced by name. Record positions refer to the EBCDIC Modeler's Tape.

FILE NAME: Area Source Modeler's Tape
Version 5.3, SAS and EBCDIC

RECORD NAME: Emissions Record

Page 2 of 2

Record Position		Length	Format	Variable Name	Description
First	Last				
111	120	10	N	TOT11	Resolved Emissions for THC (tons/hr)
121	130	10	N	TOT12	Resolved Emissions for Olefin (moles/hr)
131	140	10	N	TOT13	Resolved Emissions for Paraffin (moles/hr)
141	150	10	N	TOT14	Resolved Emissions for Toluene (moles/hr)
151	160	10	N	TOT15	Resolved Emissions for Xylene (moles/hr)
161	170	10	N	TOT16	Resolved Emissions for Formaldehyde (moles/hr)
171	180	10	N	TOT17	Resolved Emissions for Other Aldehydes (moles/hr)
181	190	10	N	TOT18	Resolved Emissions for Ethylene (moles/hr)
191	200	10	N	TOT19	Resolved Emissions for Nonreactive Hydrocarbons (moles/hr)
201	210	10	N	TOT20	Resolved Emissions for Isoprene (moles/hr)
211	220	10	N	TOT21	Resolved Emissions for Methane (moles/hr)
221	230	10	N	TOT22	Resolved Emissions for NO (tons/hr)
231	240	10	N	TOT23	Resolved Emissions for NO_2 (tons/hr)

MIP Diagnostic Report

The diagnostic report consists of the JES2 job log and the SAS job log, including the number of observations and variables in each file processed. If the totals report is requested, the MIP will print the hourly totals for area source emissions. A sample of the diagnostic report containing hourly area source totals for GMT=1 and 2 is given in Figure 4-9. A point source diagnostic report is not generated by MIP.

```
               HOURLY EMISSIONS

          VARIABLE         SUM

          -------- GMT=1 --------

          TOT1            421.7744
          TOT2             52.8337
          TOT3           9402.4839
          TOT4              3.2895
          TOT5          13730.2895
          TOT6              0.4492
          TOT7              0.0493
          TOT8           1751.7339
          TOT9             75.9121
          TOT10          2833.3979
          TOT11          3065.8735

          -------- GMT=2 --------

          TOT1            385.3869
          TOT2             50.9032
          TOT3           7435.0682
          TOT4              2.5211
          TOT5          11103.8292
          TOT6              0.1934
          TOT7              0.0340
          TOT8           1400.0884
          TOT9             64.2151
          TOT10          2348.1444
          TOT11          2535.4068
```

Figure 4-9. MIP sample "totals" diagnostic report - area sources.

SECTION 5

CONTROL STATEMENTS

Execution of the modules comprising the FREDS system is accomplished by a series of control statements written in Job Control Language (JCL). These statements introduce the job to the operating system, provide accounting information, direct the operating system on the program(s) to be executed, request hardware devices, allocate work space and temporary data sets, and provide input/output (I/O) information for the job. Application of these control statements to the execution of the FREDS system requires a working knowledge of JCL by the user.

The control statements used in FREDS are of three types: Job Statements, Execution Statements, and Data Definition Statements. Briefly, the Job Statement marks the beginning of the job, the Execution Statement names the program or procedure to be executed, and Data Definition (DD) Statements describe each data set and request allocation of I/O devices. In this section, JCL will be supplied for each module with user supplied modifications appearing in lower case letters. Typical specifications for these parameters are found within this section under "User Supplied JCL" and in the Environment section of this report. Files referenced with a disposition of SHR are assumed to be catalogued in the NCC-IBM system. This is accomplished by specifying CATLG as a DISP parameter when creating a new data set.

MODEL DATA EXTRACTION MODULE

Control Statements--Point Sources

For point source execution of MDEM, the following user supplied information is required:

- Time requirement for execution
- File names for DD labels as follows:

COF	Control Options File
TEMP	Temporary Storage
EISMF	Emissions Inventory System Master File or preprocessed SAS file (input)
MAJOR	Emissions file-major sources (output)
MINOR	Emissions file-minor sources (output - optional)
SYSIN	MDEM SAS source code

- Space requirements for output file(s) and temporary storage.

The execution deck for MDEM processing of point sources is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //MDEM EXEC SAS,OPTIONS='NODYNALLOC MACRO',SORT=xxx

4.  //TEMP DD DSN=&&TEMP1,UNIT=disk or tape,DISP=(NEW,PASS)

5.  //SYSIN DD DSN=MDEM program name,DISP=SHR

6.  //COF DD DSN=control options file name,DISP=SHR

7.  //MAJOR DD DSN=emissions file-major sources,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

8.  //MINOR DD DSN=emissions file-minor sources,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

9.  //EISMF DD DSN=Emissions Inventory System Master File tape or
    // preprocessed SAS file,DISP=SHR
```

User Supplied JCL--

Line 1. Enter information for standard job card, including the three character user ID and up to five character user-defined job name (jobname), user account number, other accounting information, user identification, and the time requirement for job execution.

Line 3. 'NODYNALLOC' and SORT=xxx may be omitted or vary for different data sets. See a SAS manual for more information on these SAS options.

Line 4. The temporary data set may be disk or tape and will vary as a function of data set size. The appropriate parameters for the unit type must be specified by the user.

Lines 5 and 6. The names of the MDEM point source SAS code and control files must be specified by the user.

Line 7. Replace "emissions file-major sources" with output file name. If point sources are not to be divided into major and minor sources, this will be the only output file for this run. Either a disk or tape data set may be specified, depending on the file size being processed. The appropriate space or label parameters must also be specified, depending on the unit type requested.

Line 8. Replace "emissions file-minor sources" with an output data set name. If major and minor sources are not separated, this line is omitted. Unit requirements follow the same rules as line 7.

Line 9. Replace "Emissions Inventory System Master File tape" or "preprocessed SAS file" with the user-defined data set name.

Control Statements--Area Sources

For area sources, the following user supplied information is necessary:

- Time requirement for execution

- File names for the following DD labels:

COF	Control Options File
TEMP	Temporary Storage
EISMF	Emissions Inventory System Master File or preprocessed SAS file (input)
AREA	Area source emissions file (output)
SYSIN	MDEM SAS source code

- Space requirements for output file(s) and temporary storage.

The execution deck for MDEM processing of area sources is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //MDEM EXEC SAS,OPTIONS='NODYNALLOC MACRO',SORT=xxx

4.  //TEMP DD DSN=&&TEMP1,UNIT=disk or tape

5.  //SYSIN DD DSN=MDEM program name,DISP=SHR

6.  //COF DD DSN=control options file name,DISP=SHR

7.  //AREA DD DSN=area source emissions file,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

8.  //EISMF DD DSN=Emissions Inventory System Master File tape or
    // preprocessed SAS file,DISP=SHR
```

User Supplied JCL--

Line 1. Enter standard job card information.

Line 3. 'NODYNALLOC' and SORT=xxx may be omitted or vary as a function of file size. Refer to a SAS manual for more information on these SAS options.

Line 4. The unit type will vary with file size.

Lines 5 and 6.	The MDEM area source SAS code and corresponding control options file must be specified by the user.
Line 7.	Enter output area source emissions file name, unit type and appropriate parameters as a function of file size.
Line 8.	Enter the EIS Master File or preprocessed SAS file data set name.

TEMPORAL ALLOCATION MODULE

Control Statements--Point Sources

To execute the TAM for point sources, the following user supplied information is required:

- Time requirement for execution
- File names for DD labels as follows:

COF	Control Options File
WORK	Temporary work space
TEMP	Temporary storage
TEMP1-TEMP5	Temporary data storage
INFILE	Input Emissions File
TZF	Time Zone File
TAFF	Temporal Allocation Factor File
OUTFILE	Temporally allocated emissions file (output)
SYSIN	TAM SAS source code

- Space requirements

The execution deck for TAM processing of points sources is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=USERID,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //TAM EXEC SAS,OPTIONS=MACRO

4.  //SYSIN DD DSN=TAM program name,DISP=SHR

5.  //COF DD DSN=control options file name,DISP=SHR

6.  //WORK DD UNIT=SYSDA,SPACE=(ppp,sss)

7.  //TEMP DD DSN=&&TEMP,DISP=(NEW,PASS),UNIT=disk or tape

8.  //TEMP1 DD DSN=&&TEMP1,DISP=(NEW,PASS),UNIT=disk or tape

9.  //TEMP2 DD DSN=&&TEMP2,DISP=(NEW,PASS),UNIT=disk or tape
```

```
10.  //TEMP3 DD DSN=&&TEMP3,DISP=(NEW,PASS),UNIT=disk or tape

11.  //TEMP4 DD DSN=&&TEMP4,DISP=(NEW,PASS),UNIT=disk or tape

12.  //TEMP5 DD DSN=&&TEMP5,DISP=(NEW,PASS),UNIT=disk or tape

13.  //INFILE DD DSN=emissions file data set name,DISP=SHR

14.  //OUTFILE DD DSN=temporally allocated emissions file name,
     // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape

15.  //TZF DD DSN=time zone file name,DISP=SHR

16.  //TAFF DD DSN=temporal allocation factor file name,DISP=SHR
```

User Supplied JCL--

Line 1.	Enter information for standard job card.
Lines 4 and 5.	Enter user supplied TAM SAS source code and control options file names.
Line 6.	Enter required direct access primary (ppp) and secondary (sss) work space.
Lines 7-12.	These lines represent temporary storage disk space or tapes. Size requirements of the storage space may vary as a function of the files being processed. The user should determine temporary space requirements and appropriate parameters for each case.
Line 13.	Enter the emissions file input data set name.
Line 14.	Enter temporally allocated output data set name, unit type and parameters.
Lines 15 and 16.	Enter the names of time zone and temporal allocation factor files.

Control Statements--Area Sources

The Temporal Allocation Module for area sources is comprised of four sequential programs or job steps. The first preprocesses the data for temporal allocation similar to the point source module. The second step utilizes the IBM utility SYNCSORT to sort emissions by column and row or SCC, State, and County. Once the sort is complete, a FORTRAN routine is used to multiply emissions by their temporal allocation factors. The fourth and final step is a SAS program to convert the EBCDIC output back to SAS format. The user input for execution is as follows:

- Time requirement for execution
- File names for DD labels as follows:

COF	Control Options File (TAM.SAS, MTPREP.FORT, MTPREP.SAS)
TEMP	Temporary storage
SORTIN	Temporary TAM EBCDIC output, SYNCSORT input
SORTOUT	Temporary sort output file
TAMIN	Input Emissions File
INFILE	MTPREP.SAS input file (FORTOUT)
TAFF	Temporal Allocation Factor File
STATE	State specific allocations, temporary file
SCC	SCC specific allocations, temporary file
JOBLIB	MTPREP.FORT load library
FT10F001	MTPREP.FORT Control Options File
FT11F001	MTPREP.FORT input (SORTOUT)
FT20F001	MTPREP EBCDIC output (FORTOUT)
OUTFILE	MTPREP.SAS SAS formatted output (temporally resolved emissions file)
SYSIN	TAM or MTPREP.SAS Source Code

- Space requirements for execution and output of TAM, SYNCSORT, MTPREP.FORT, and MTPREP.SAS.

The execution deck for sequential TAM processing of area sources is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //JOBLIB DD DSN=partitioned data set name containing MTPREP.FORT load
    // module,DISP=SHR

4.  //TAM EXEC SAS,OPTIONS=MACRO

5.  //SYSIN DD DSN=TAM program file name,DISP=SHR
```

```
 6.  //COF DD DSN=TAM control options file name,DISP=SHR

 7.  //TEMP DD DSN=&&TEMP,DISP=(NEW,PASS),UNIT=disk or tape

 8.  //SORTIN DD DSN=&&SORTIN,UNIT=disk or tape, DISP=(NEW,PASS),
     // DCB=parameters

 9.  //STATE DD DSN=&&TEMP2,UNIT=disk or tape

10.  //SCC DD DSN=&&TEMP3,UNIT=disk or tape

11.  //TAMIN DD DSN=emissions file data set name,DISP=SHR

12.  //TAFF DD DSN=temporal allocation factor file name,DISP=SHR

13.  /*

14.  //*SORT TAM OUTPUT FILE (SORTIN)

15.  //SORT EXEC PGM=SYNCSORT,PARM='SIZE(MAX),FLAG(I),LIST'

16.  //SYSOUT DD SYSOUT=A

17.  //SORTIN DD DSN=&&SORTIN,DISP=(OLD,DELETE,KEEP)

18.  //SORTOUT DD DSN=&&SORTOUT,DISP=(NEW,PASS),UNIT=disk or tape

19.  //SORTWKnn DD UNIT=disk

20.  //SYSIN DD SORT FIELDS=See "User supplied JCL",FORMAT=CH,FILSZ=Exxxx

21.  /*

22.  //*EXECUTE MTPREP.FORT

23.  //FORT EXEC PGM=MTPREP

24.  //FT06F001 DD SYSOUT=A

25.  //FT10F001 DD DSN=control options file name,DISP=SHR

26.  //FT11F001 DD DSN=&&SORTOUT,DISP=(OLD,DELETE,KEEP)
```

```
27.  //FT20F001 DD DSN=&&FORTOUT,DISP=(NEW,PASS),UNIT=disk or tape,
     // DCB=parameters

28.  /*

29.  //* EXECUTE MTPREP.SAS

30.  //SAS EXEC SAS,OPTIONS=MACRO

31.  //SYSIN DD DSN=program file name,DISP=SHR

32.  //COF DD DSN=control options file name

33.  //INFILE DD DSN=&&FORTOUT,DISP=(OLD,DELETE,KEEP)

34.  //OUTFILE DD DSN=temporally resolved emissions file,UNIT=tape or disk,
     // DISP=(NEW,CATLG,DELETE)
```

User Supplied JCL--

Line 1.	Enter information for standard job card.
Line 3.	Enter the name of the partitioned data set containing the MTPREP.FORT load module.
Lines 5 and 6.	Enter the TAM area source SAS code and corresponding control file names.
Lines 7-10.	These are temporary data sets. Since the space allotted to them may vary with file size, the unit type and associated parameters must be input by the user. NOTE: SORTIN is the TAM output data set and is passed on to the next step for further processing. DCB parameters must be calculated for SORTIN as follows: RECFM=FB,LRECL=240+PARMS+NPOLL*10 and BLKSIZE=LRECL*20. The constant 240 is a function of 24 hours/day, NPOLL is the total number of pollutants, and PARMS is equal to 8 for gridded emissions (COL,ROW) and 14 for county level emissions files (SCC, State, County).
Line 11.	Enter emissions file input data set name.
Line 12.	Enter the name of the temporal allocation factor file to be used for processing.

Line 15. Parameters specified with SYNCSORT control space and output. For further information on SYNCSORT options refer to the online documentation 'JUSD.SYNCSORT.DATA'

Line 19. This line is required for disk sorts unless DYNALLOC, MERGE, or in-core sort are used. Substitute sort work area number in place of nn. Enter appropriate parameters for disk space. For tape sort units, use the SORTLIB DD label. Note: more than one sort work area may be specified.

Line 20. The sort fields to be specified will be different for gridded and county-level emissions. The general format is to specify the position of the first character of the first sort field, the width of the sort field, and whether it is to be sorted ascending or descending. This is repeated for each additional sort field. For gridded emissions files, SORT FIELDS = (1,4,A,5,4,A). In this case, the first sort field (column) begins with the first character, has a width of four and is sorted in ascending order. The second sort field (row) begins with the fifth character, has a width of four, and is also sorted in ascending order. To sort county-level emissions by SCC, State, County, the sort fields specified are: (1,8,A,9,2,A,11,4,A). The format parameter specifies the character type (CH=EBCDIC), and the FILSZ is an estimate of the number of records to be sorted. The sort fields will always either reflect column and row, or SCC state and county. FILSZ will vary from file to file.

Line 24. SYSOUT=A may be replaced with any other printer unit available (e.g., SYSOUT=L for the laser printer).

Lines 25 and 32. Enter the name of the user-supplied Control Options File for program execution. The same COF is used for MTPREP.FORT and MTPREP.SAS.

Line 27. The unit and corresponding parameters must be specified for the output data set. DCB parameters for SORTOUT must be specified as follows: RECFM=FB,LRECL=VAR+10*NPOLL and BLKSIZE=LRECL*20. VAR is equal to 10 for gridded emissions (to account for the variables COL, ROW, and GMT, of lengths 4,4 and 2, respectively) and 16 for county level (to account for the variables EISSCC, STATE, COUNTY AND GMT, of lengths 8,2,4, and 2, respectively); NPOLL is the total number of pollutants.

Line 31. Enter the SAS source code file name containing the program MPREP.SAS.

Line 34. Enter the user-defined name of the output data set and the unit to which it is to be written. The appropriate unit parameters must also be specified.

SPECIATION MODULE

Control Statements--Point Sources

The following user supplied information is required for the execution of the Speciation Module for point sources:

- Time requirement for execution
- File names for DD labels as follows:

COF	Control Options File
INFILE	Input Emissions File
SFF	Speciation Factor File
PSPLIT	PSPLIT output file (input)
OUTFILE1	Speciated emissions file (output)
OUTFILE2	SM orphaned emissions file
SYSIN	SM SAS source code

- Space requirements

The execution deck for SM processing of point sources is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //SM EXEC SAS,OPTIONS=MACRO

4.  //SYSIN DD DSN=SM program file name,DISP=SHR

5.  //COF DD DSN=control options file name,DISP=SHR

6.  //INFILE DD DSN=emissions file data set name,DISP=SHR
```

```
 7.  //OUTFILE1 DD DSN=speciated emissions file data set name,
     // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape

 8.  //OUTFILE2 DD DSN=SM orphaned emissions file name,DISP=(NEW,CATLG,DELETE),
     // UNIT=disk or tape

 9.  //SFF DD DSN=speciation factor file name,DISP=SHR

10.  //PSPLIT DD DSN=PSPLIT file name,DISP=SHR
```

User Supplied JCL--

Line 1.	Enter information for standard job card.
Line 4.	Enter the file name containing the SM source code.
Line 5.	Enter the file name of the user supplied Control Options File.
Line 6.	Enter input data set name.
Line 7.	Enter output data set name for speciated emissions file. Specify the unit type and space or label parameters.
Line 8.	Enter output data set name for emission records with no speciation profiles. Specify output unit type and corresponding parameters.
Line 9.	Enter the name of the speciation factor file to be used for processing.
Line 10.	Enter the name of the PSPLIT output file to be used for processing.

Control Statements--Area Sources

Speciation Module processing of area sources requires the following user supplied information:

- Time requirement for execution.

- File names for DD labels as follows:

COF	Control Options File
WORK	Temporary work space
INFILE	Input Emissions File
SFF	Speciation Factor File
PSPLIT	PSPLIT output file (input)
SAROAD	Pollutant class description file
TZF	Time Zone File
SMOUT	Speciated emissions file (output)
ORPHAN	SM orphaned emissions file (output)
SYSIN	SM SAS source code

The execution deck for SM processing of area sources is provided below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //SM EXEC SAS,OPTIONS=MACRO

4.  //SYSIN DD DSN=SM program file name,DISP=SHR

5.  //TZF DD DSN=time zone file name,DISP=SHR

6.  //WORK DD UNIT=disk or tape

7.  //COF DD DSN=control options file name,DISP=SHR

8.  //INFILE DD DSN=emissions file library data set name,DISP=SHR

9.  //SMOUT DD DSN=speciated emissions file name,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

10. //ORPHAN DD DSN=SM orphaned data set name,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

11. //SFF DD DUMMY

12. //PSPLIT DD DSN=PSPLIT output file name,DISP=SHR

13. //SAROAD DD DSN=pollutant class description file name,DISP=SHR
```

User Supplied JCL--

Line 1.	Enter information for standard job card.
Line 4.	Enter the file name containing the SM SAS source code.
Line 5.	Enter the name of the file containing the time zone data.
Line 6.	The unit type and parameters will vary with file size. For larger data sets, a tape may be necessary. For smaller data sets, disk space may be allocated.
Line 7.	Enter a user supplied Control Options File name for SM execution.
Line 8.	Enter input data set name from emissions file library.
Line 9.	Enter output data set name. Enter unit type and space or label parameters.
Line 10.	Enter orphaned output data set name. Specify the unit type and parameters for the orphaned data set.
Line 11.	SFF is designated as a dummy data set as it is not used for area sources in the 1980 inventory. However, particulate classes or other species for area sources may be input using SFF in the future.
Line 12.	Input the PSPLIT file name corresponding to the desired number of speciation classes.
Line 13.	Enter the file name of the pollutant class description file.

SPATIAL ALLOCATION MODULE

Control Statements--Point Sources

To execute SAM for point sources, the following user supplied information is necessary:

- Time requirement for execution
- File names for the following DD labels:

COF	Control Options File
INFILE	Input Emissions File
OUTFILE1	Spatially allocated emissions file (output)
OUTFILE2	Orphaned emissions file
SYSIN	SAM SAS source code

- Space requirements for output and module execution.

The execution deck for SAM processing of point sources is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //SAM EXEC SAS,OPTIONS=MACRO

4.  //SYSIN DD DSN=SAM program file name,DISP=SHR

5.  //COF DD DSN=SAM control options file name,DISP=SHR

6.  //INFILE DD DSN=emissions file data set name,DISP=SHR

7.  //OUTFILE1 DD DSN=spatially allocated emissions file,
    // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape

8.  //OUTFILE2 DD DSN=orphaned emissions file name,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape
```

User Supplied JCL--

Line 1.	Enter information for standard job card.
Line 4.	Enter the SAM SAS source code file name.
Line 5.	Enter the name of the user supplied control options file.
Line 6.	Enter input data set name.
Line 7.	Enter spatially allocated output data set name. Enter the unit type (disk or tape) and necessary JCL parameters.
Line 8.	Enter name of orphaned emissions data set and allocate the unit type and parameters.

Control Statements--Area Sources

Spatial allocation of area sources requires the following user supplied information:

- Time required for execution
- File names for the following DD labels:

COF	Control Options File
SAMIN	Input Emissions File
SAFF	Spatial Allocation Factor File
SAFFIN	Spatial Allocation Factor File in SAS format and condensed (temporary)
SAFFOUT	SAFF subsetted and sorted
SAMOUT	Spatially allocated emissions (output)
SYSIN	SAM SAS source code

- Space requirements for output and module execution.

The execution deck for SAM processing of area sources is presented below.

```
1. //jobname JOB (account#,account information),name,NOTIFY=userid,
   // TIME=(minutes,seconds)
```

```
 2.  /*ROUTE PRINT HOLD

 3.  //SAM EXEC SAS,OPTIONS=MACRO

 4.  //SYSIN DD DSN=SAM program file name,DISP=SHR

 5.  //COF DD DSN=SAM control options file name,DISP=SHR

 6.  //SAMIN DD DSN=input emissions data set,DISP=SHR

 7.  //SAFF DD DSN=spatial allocation factor file name,DISP=SHR

 8.  //SAFFIN DD DSN=&&TEMP,UNIT=disk,SPACE=(TRK,(pppp,sss))

 9.  //SAFFOUT DD DSN=&&SORT,UNIT=disk,SPACE=(TRK,(pppp,sss))

10.  //SAMOUT DD DSN=spatially allocated emissions data set,
     // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape
```

User Supplied JCL--

Line 1.	Enter standard job card.
Line 4.	Enter SAM SAS source code file name.
Line 5.	Input user supplied SAM control options file name for execution of the module.
Line 6.	Input emissions file to be spatially allocated.
Line 7.	Enter the name of the spatial allocation factor file to be used for SAM processing.
Lines 8 and 9.	The unit type may change as a function of the files being processed, however, in most cases disk space should be sufficient. The number of primary (pppp) and secondary (sss) tracks must be specified by the user.
Line 10.	The unit type and SPACE or LABEL parameters must also be specified by the user.

MODEL INPUT PREPROCESSOR

Control Statements--Point Sources

The processing of point source emissions data to produce a SAS modeler's tape requires the combination of files comprising U.S. and Canadian point source emissions. To accomplish this, the following user supplied input is necessary:

- Time requirement for execution
- File names for DD labels as follows:

COF	Control Options File
IN1	Emissions file #1 (e.g., U.S. point sources)
IN2	Emissions file #2 (e.g., Canadian point sources)
INn	Emissions file #n
MIPIN	Temporary Storage
MIPOUT	SAS Modeler's Tape (output)
SYSIN	MIP SAS source code

- Space requirements for execution and output.

The MIP execution deck for point source processing is presented below.

```
1.  //jobname JOB (account#,account information),name,NOTIFY-userid,
    // TIME=(minutes,seconds)

2.  /*ROUTE PRINT HOLD

3.  //MIP EXEC SAS,OPTIONS='MACRO NODYNALLOC',SORT=xxx

4.  //IN1 DD DSN=point source file#1,DISP=SHR

5.  //IN2 DD DSN=point source file#2,DISP=SHR

6.  //INn DD DSN=point source file#n,DISP=SHR

7.  //MIPIN DD DSN=&&TEMP,UNIT=disk or tape

8.  //MIPOUT DD DSN=output data set name,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape
```

```
 9.  //COF DD DSN=MIP control options file name,DISP=SHR

10.  //SYSIN DD DSN=MIP program file name,DISP=SHR
```

User Supplied JCL--

Line 1.	Enter information for standard job card.
Line 3.	'NODYNALLOC' and SORT=xxx may vary or be omitted for different data sets. Refer to a SAS manual for more information on these SAS options.
Lines 4-6.	Enter point source data set names.
Line 8.	Enter output data set name, unit type and associated JCL parameters (e.g., SPACE or LABEL).
Line 9.	Enter the name of the user supplied control options file for MIP execution.

If the user wishes to convert point source MIP output from SAS format to EBCDIC characters, the following information is required:

- File names for DD labels as follows:

  INFILE - SAS Modeler's Tape (MIPOUT)
  FILE1 - EBCDIC Modeler's Tape (OUTPUT)
  SYSIN - SAS Source Code for SAS to EBCDIC Conversion
  COF - Control Options File

The execution deck for the conversion as an add-on to MIP is as follows:

```
11.  /*
12.  //EBCDIC EXEC SAS
13.  //INFILE DD DSN=SAS formatted MIP output file,DISP=SHR
14.  //FILE1 DD DSN=output EBCDIC modeler's tape data set name,
     // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape,DCB=parameters
15.  //SYSIN DD DSN=SAS source code,DISP=SHR
16.  //COF DD DSN=EBCDIC conversion control options file,DISP=SHR
```

User supplied JCL is described below. If the conversion is executed as a separate program, two additional job cards are required -- 1 and 2 as given in the MIP execution deck.

Line 13. Enter the MIP output data set name from line number 8 (above).

Line 14. Enter the EBCDIC Modeler's tape output data set name. The unit and corresponding parameters must be specified for the output data set. DCB parameters for FILE1 must be specified as follows: RECFM=FB, LRECL=1949 for a speciated, temporally, and spatially resolved Version 5.3 modeler's tape (for 5.2, LRECL=2249), and BLKSIZE=LRECL*20 (note: the user may also define a multiplier other than 20 for determination of blocksize).

Line 15. The SAS source code file name should be entered here. If desired, the user may specify SYSIN DD * and incorporate the source code with the JCL. This is particularly useful if this step is to be executed separately from MIP.

Line 16. Enter the user-supplied SAS-EBCDIC control options file name.

Control Statements--Area Sources

The processing of area sources through the FREDS system is segmented due to the large size of the file containing all United States and Canadian area sources. For the 1980 NAPAP Emissions Inventory, five area source segments were used to process the emissions data. The MIP runstream for area sources therefore consists of three parts: (1) combining and processing data sets USA1 and USA2; (2) combining and processing USA3, USA4, and Canada; and (3) combining the outputs from (1) and (2) to produce a SAS modeler's tape. The user input necessary to accomplish this is:

- Time requirement for execution
- File names for DD labels as follows:

COF	Control Options File
IN1,IN2,IN3	Area source emissions files (input)
MIPIN	Temporary data storage
MIPOUT	SAS Modeler's Tape (output data set)
MIPBACK	Backup tape of output data set (SAS format)
SYSIN	SAS source code for MIP

The MIP execution deck for area source processing is presented below:

Step 1: Combine USA1 and USA2

```
 1.  //jobname JOB (account#,account information),name,NOTIFY=userid,
     // TIME=(minutes,seconds)

 2.  /*ROUTE PRINT HOLD

 3.  //MIPA EXEC SAS,OPTIONS='MACRO NODYNALLOC',SORT=xxx

 4.  //IN1 DD DSN=US area source file#1,DISP=SHR

 5.  //IN2 DD DSN=US area source file#2,DISP=SHR

 6.  //MIPIN DD DSN=&&TEMP,UNIT=disk or tape

 7.  //MIPOUT DD DSN=intermediate output data set name,DISP=(NEW,PASS,KEEP),
     // UNIT=disk or tape

 8.  //MIPBACK DD DUMMY

 9.  //COF DD DSN=MIP control options file name,DISP=SHR

10.  //SYSIN DD DSN=MIP source code file name,DISP=SHR

11.  /*
```

Step 2: Combine USA3, USA4, and Canada

```
12.  //MIPB EXEC SAS,OPTIONS='MACRO NODYNALLOC',SORT=xxx

13.  //IN1 DD DSN=US area source file#3,DISP=SHR

14.  //IN2 DD DSN=US area source file#4,DISP=SHR

15.  //IN3 DD DSN=Canadian area source file,DISP=SHR

16.  //MIPIN DD DSN=&&TEMP,UNIT=disk or tape

17.  //MIPOUT DD DSN=intermediate output data set name,DISP=(NEW,PASS,KEEP),
     // UNIT=disk or tape

18.  //MIPBACK DD DUMMY

19.  //COF DD DSN=MIP control options file name for step 2,DISP=SHR
```

```
20. //SYSIN DD DSN=MIP program file name,DISP=SHR

21. /*
```

Step 3: Combine MIPOUTA and MIPOUTB

```
22. //MIP EXEC SAS,OPTIONS='MACRO NODYNALLOC',SORT=xxx

23. //IN1 DD DSN=intermediate output data set from MIPA,DISP=(OLD,DELETE,KEEP)

24. //IN2 DD DSN=intermediate output data set from MIPB,DISP=(OLD,DELETE,KEEP)

25. //MIPIN DD DSN=&&TEMP,UNIT=disk or tape

26. //MIPOUT DD DSN=modeler's tape output data set,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

27. //MIPBACK DD DSN=backup output data set name,DISP=(NEW,CATLG,DELETE),
    // UNIT=disk or tape

28. //COF DD DSN=MIP control options file name for step 3,DISP=SHR

29. //SYSIN DD DSN=MIP program file name,DISP=SHR
```

User Supplied JCL--

Line 1.	Enter standard job card information.
Lines 3, 12,22.	'NODYNALLOC' and SORT=xxx may vary and may be omitted for different data sets. Refer to a SAS manual for further information on these options.
Lines 4,5, 13,14,15.	Enter area source emissions file data set names.
Lines 6, 16,25.	For large area source emissions files that are segmented due to size limitations, a tape unit will be necessary. If area source subfiles have been segmented for other reasons (e.g., SCC specific), disk space may be adequate.
Lines 7 and 17.	Enter intermediate output data set names, unit types, and necessary JCL parameters for the specified units.

Lines 9, 19,28. Enter file names for user supplied control options for each job step.

Lines 23 and 24. Enter intermediate output data set names from steps MIPA and MIPB as input for final processing.

Lines 26 and 27. Enter final output data set names and the units to which the output is to be written. The user must specify the SPACE or LABEL parameters when appropriate.

To produce an EBCDIC area source modeler's tape from the SAS formatted MIP output, the following information is required:

- File names for DD labels as follows:

  INFILE - SAS Modeler's Tape (MIPOUT)
  FILE1 - EBCDIC Area Source Modeler's Tape for the western half of the NAPAP domain (i.e., column less than or equal to 100).
  FILE2 - EBCDIC Area Source Modeler's Tape for the eastern half of the NAPAP domain (i.e. column greater than 100).
  SYSIN - SAS source code for SAS to EBCDIC conversion
  COF - Control Options File

The execution deck for the SAS-to-EBCDIC conversion as an additional MIP job step is as follows:

```
30.  /*
31.  //EBCDIC EXEC SAS
32.  //INFILE DD DSN=SAS formatted MIP output file,DISP=SHR
33.  //FILE1 DD DSN=output EBCDIC modeler's tape for western half of NAPAP,
     // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape,
     // DCB=parameters
34.  //FILE2 DD DSN=output EBCDIC modeler's tape for eastern half of NAPAP,
     // DISP=(NEW,CATLG,DELETE),UNIT=disk or tape,DCB=parameters
35.  //SYSIN DD DSN=SAS source code, DISP=SHR
36.  //COF DD DSN = SAS-EBCDIC control options file,DISP=SHR
```

User supplied JCL is described below. If the conversion is executed as a separate program, two additional job cards are required -- 1 and 2 as given with the MIP execution deck.

Line 32. Enter the MIP output data set name from line number 26 (above).

Lines 33 and 34. Enter the EBCDIC output data set names corresponding to columns less than or equal to 100 (FILE1) and greater than 100 (FILE2). The unit and corresponding parameters must be specified by the user. DCB parameters for FILE1 and FILE2 are specified as follows: RECFM=FB, LRECL=VAR+10*NPOLL, and BLKSIZE=LRECL*20. VAR is equal to 10 for gridded emissions (to account for the variables COL, ROW, and GMT of lengths 4,4 and 2, respectively) and 16 for county-level (to account for the variables EISSCC, STATE, COUNTY, and GMT, of lengths 8,2,4 and 2, respectively); NPOLL is the total number of pollutants.

Line 35. Enter the SAS source code file name. If desired, the user may specify SYSIN DD * and incorporate the source code with the JCL. This may be useful as a separate execution or add-on to MIP, as the SAS code is brief.

Line 36. Enter the file name for the user-supplied control options file.

SECTION 6

OPERATING INSTRUCTIONS

Operating instructions for FREDS are discussed in four subsections: (1) User Supplied Data, (2) Error Messages, (3) Summary Statistics, and (4) User Warnings/Considerations.

USER SUPPLIED DATA

For execution of the FREDS system, the user must provide the following:

1. Standard job cards
2. EXEC and DD cards for each module
3. Control Options File (COF) for each module
4. SAS source code for each module
5. MTPREP.FORT load module
6. Emissions file data set names
7. Emissions Inventory System Master Files or preprocessed SAS files (point and area sources)
8. Time Zone File
9. Temporal Allocation Factor Files
10. Speciation Factor File
11. PSPLIT Output File
12. Pollutant Description File (area source processing)
13. Spatial Allocation Factor File (area source processing)

ERROR MESSAGES

Error handling in the FREDS modules consists of warning messages (the user is notified of its occurrence, but program execution continues) and error messages (execution is terminated). Errors are usually associated with user selected options in the COF. Errors should not be found in the EIS Master Files or preprocessed SAS files, as these data have been checked by the EIS system. EIS data which do not meet FREDS criteria will, however, generate warning messages.

Model Data Extraction Module

Warning Messages--

The MDEM point and area source programs issue warning messages when variables in the EIS Master File do not meet certain criteria. If this condition is encountered, MDEM prints a warning message in the job output and continues execution. These warnings are:

1. If an invalid EIS record type is encountered, i.e., type <0 or type >3, a warning is issued with the record number of the occurrence. For point sources, 0=Plant record, 1=Point record, 2=SCC record, and 3=Comment record. For area sources, 0=Description record, 1=Category record, and 2=Comment record.

2. If invalid operating data, i.e., if day=0 or hour=0 or week=0, are encountered on the plant record (type=1), a warning message is issued with the State, County, and Plant at which the invalid data were encountered.

3. If EISSCC=0 on the SCC record (type=2) a warning message for invalid EISSCC code is issued along with the State, County, Plant and Point of occurrence.

Error Messages--

Fatal error messages are issued and program execution ceases if any of the following occurs in the Control Options File:

1. More than one Run Identification (type 1) record is encountered (point and area sources);

2. File type on the Run Identification record does not specify point or area source;

3. Diagnostic report option (type 1 record) does not indicate detailed (D) or summary (S) options for point sources, or detailed, summary, or totals (T) for area sources;

4. More than 24 SIC/SCC combinations are requested for point sources and more than 49 combinations are requested for area sources on the SIC/SCC definition record (type 2);

5. For point sources only, the number of emissions limits for major-minor source separation exceeds 15 on type 3 record;

6. For area sources only, if the number of annual pollutants to be extracted is less than 1 or greater than 15 (type 3 control record);

7. For area sources only, the record type for the Pollutant Identification record must be represented by a blank or missing value symbol;
8. Control record type not specified by 1, 2, or 3 for point or area sources.

Temporal Allocation Module

Warning Messages--

1. Seasonal throughputs for point sources are totaled and checked. If THRU_TOT is less than 95 or greater than 105, the throughputs are normalized to 100 by adding the value of MAKEUP to each seasonal throughput value where:

   MAKEUP = (100 - THRU_TOT/4).

   When this occurs, a warning message is printed along with the SCC, State, County, Plant, and Point of occurrence. The program resumes normal execution.

Error Messages--

If invalid data is found in the Control Options File of the main TAM module, MTPREP.FORT, or MTPREP.SAS (the subroutines correspond to area sources only), execution ceases. The following errors may occur in the Control Options File(s):

1. More than one Run Identification (type 1) record is found (point and area sources);
2. Source type on Run Identification record is not designated as AS or PS;
3. The diagnostic report option (type 1 record) is not specified as D (detailed) or S (summary) (point and area sources);
4. For area sources only, invalid daylight savings time option on type 1 record, i.e., if DAYLITE ≠ Y and DAYLITE ≠ N;
5. More than one type 2 record (Pollutant Variable List) is found (area sources only);
6. Control record type less than 1 or greater than 3 for area sources. For point sources, control record type not equal to 1;
7. More than 100 pollutants are specified for NUMPOLL in the area source subroutine MTPREP.FORT, and NUMPOLL is less than 1 for MTPREP.SAS;
8. If the level of resolution specified for EMRES in the TAM and MTPREP control files is not equal to "gridded" or "nongridded".

Speciation Module

Error Messages--

Error messages are issued and program execution terminated if any invalid data are found in either the PSPLIT output file or SM Control Options File. Possible speciation module errors are as follows:

1. A PSPLIT record type less than 1 or greater than 2 (1=Header record, 2=speciation factors) (point and area sources);
2. More than one Run Identification (type 1) record in the Control Options File (point and area sources);
3. The diagnostic report option (type 1 record in the COF) is not specified as D (detailed), S (summary), or T (totals) for area sources and as D or S for point sources;
4. More than 15 Speciation File Format (type 2) records are found in the COF for either a point or area source run. This indicates an invalid number of major pollutant classes specified;
5. In the area source COF, THC must be the first major pollutant category specified for speciation;
6. NO_x must be the second major pollutant category listed for speciation of area source pollutants;
7. Speciation of more than 30 subclasses for each major pollutant category for point and area source files;
8. A control record type not equal to 1 or 2 for the point and area source control files;
9. A missing value is found for the total number of species to be processed for area sources.

Spatial Allocation Module

Error Messages--

Fatal error messages are issued and execution is terminated if any of the following occurs in the Control Options File:

1. More than 1 Run Identification (type 1) record or Grid Definition (type 2) record for both point and area sources. For area sources only, more than one Subfile Definition (type 3) record or Pollutant List (type 4) record;
2. A report detail option not specified by D (detailed), S (summary), or T (totals) (type 1 record) for area sources and a report option not specified by D or S for point sources;
3. A source type not specified by AS or PS on the Run Identification record;
4. More than 1 million input records specified on area source record type 3;
5. Control record type not equal to 1, 2, 3, or 4 for area sources, or for point sources, control record type not equal to 1 or 2.

Model Input Preprocessor

Error Messages--

Fatal error messages are issued and execution is terminated if any of the following occurs in the Control Options File:

1. Diagnostic report option does not indicate summary (S) or totals (T);
2. Source type on the Run Identification record is not specified as AS (area source) or PS (point source);
3. Incorrect source type for control record type 2 (Pollutant Variable List)--must be AS;
4. Incorrect source type for control record type 3 (Resolution record)--must be AS;
5. The emissions resolution on the Resolution record is not specified by "gridded" or "nongridded";
6. For the point source SAS-EBCDIC control file, an inventory version number not specified by 5.2 or 5.3;
7. For the area source SAS-EBCDIC control file, if NUMPOLL is less than 1 or EMRES is not specified by "gridded" or "nongridded".

SUMMARY STATISTICS

Summary statistics for each FREDS module are included on the IBM job log and consist of a diagnostic report summarizing module execution and a SAS job summary. The job log must be explicitly saved or printed within 3 days after it has been produced, otherwise the job is deleted from the queue and report information will be lost. In addition, erroneous or invalid data are output to orphan files and printed with the diagnostic report when applicable. In general, three levels of detail may be specified for area source diagnostic reports: summary (S), totals (T), and detailed (D). For TAM however, only summary or detailed reports may be requested. For point sources, summary or detailed reports may be requested for each module. Although each module report may vary somewhat, a minimal summary report containing the date and time of execution, FREDS and module titles, and Control Options File listing is always reported.

Model Data Extraction Module Diagnostic Report

The following information is minimally provided for each MDEM execution (detail=S):

- a header record with the date, time, and title (FREDS and module title); and
- a listing of applicable Control Option File records.

If the detailed summary is requested, the following information is provided in addition to the above summary:

- all records of each emissions file or subfile output from MDEM.

If the source type=AS, and the level of detail requested is T (totals), the following information is printed in addition to the above summary:

- emissions totals for each pollutant in each emissions file.

Temporal Allocation Module Diagnostic Report

For TAM, one of two levels of detail may be specified in the Control Options File: summary or detail. MTPREP.FORT and MTPREP.SAS are controlled by their own COFs but a diagnostic report is generated by MTPREP.SAS only. The following information is printed for each TAM module run:

- a header record with the date and time of execution and the FREDS and TAM titles; and
- a listing of the Control Options File for the specified source type; for area sources, this also includes the MTPREP.SAS COF listing.

If a detailed report is requested, the temporal allocation factors added to each emission record are printed.

Speciation Module Diagnostic Report

Each execution of the Speciation Module generates a summary report with the following information:

- date, time, FREDS title, and module title;
- types 1 and 2 Control Options File records; and
- speciation factor identities, e.g., speciation factor number, pollutant SAROAD code, and pollutant description.

For point sources, emission records with no speciation profile are printed with the summary report. If a detailed report is requested, the speciation factors for point and area source pollutants are printed in addition to the above summary.

If the "totals" summary is requested for area sources, the following information is output in addition to the summary report:

- annual totals of speciated emissions;
- a printout of emission records for which no time zone data were present. The list includes EISSCC, State, and County;
- a printout of emission records for which no speciation profiles were present. The list includes EISSCC, State, and County.

Spatial Allocation Module Diagnostic Report

The following summary is the minimum information provided for each SAM execution (detail=S):

- a header record containing the date, time, FREDS title, and module title;
- a listing of Control Option File record types 1-4 for area sources and types 1-2 for point sources;
- a listing of point source emission records for which no location data were present. The list includes the corresponding EISSCC, State, County, Plant ID, Point ID;
- a listing of point source emission records whose coordinates are outside grid boundaries. The list includes the corresponding EISSCC, State, County, Plant ID, Point ID, Latitude, Longitude, Column, and Row; and
- A listing of area source spatial allocation factors which have no matching emission records. The list includes EISSCC, State, and County.

If a detailed report is requested, spatial allocation data are printed in addition to the above summary. For area sources, if the "totals" summary is specified, emissions totals for each pollutant are listed in addition to the summary report.

Model Input Preprocessor Diagnostic Report

The model input preprocessor allows two levels of detail to be specified for area sources (S or T) and one level for point sources. For both point and area sources, the summary report is the Control Options File and the SAS summary.

For area sources, if detail=T is requested, hourly totals are printed and a backup data set sorted by GMT is output.

For the SAS to EBCDIC conversion, a brief report echoing the control options file is printed for both point and area sources.

SAS Summary Statistics

In addition to the diagnostic report for each module execution, a SAS job log is printed for each EXEC SAS statement. The summary statistics are as follows:

- SAS options specified;
- file names and parameters for JCL DD statements corresponding to EBCDIC files for each EXEC statement;
- the number of lines in each file or data set;
- the number of variables in each file or data set;
- the number of observations per track for each file or data set;
- the time and memory used for each SAS step in the job;
- data conversions which have taken place (e.g., numeric to character); and
- generation of missing data by SAS operators or procedures.

USER WARNINGS/CONSIDERATIONS

In executing the FREDS programs, the main consideration the user should be aware of is the space (temporary and permanent) requirements for execution of each module and the available hardware (e.g., disk and tape drives). The EIS Master Files and preprocessed SAS files input into FREDS through MDEM contain a very large volume of data. With the execution of each module, more data are added to each output emissions file. In order to reduce what could become unmanageable storage requirements, area source annual pollutant emissions are extracted into user defined SAS variables prior to or in MDEM. By abandoning the EIS format, file space is saved, e.g., 30 variables for 15 annual pollutants (SAROAD1-15 and EMISS1-15) are read into 15 variables. In addition, EIS/AS variables not referenced by FREDS are dropped. Although every effort has been made to minimize space requirements necessary for area source processing, the user is urged to evaluate the necessary requirements for execution and output. As a precaution, FREDS limits the user to one million records in the spatial allocation module, as this module expands the area source file by a factor of about 100. This is still a large volume of data and, therefore, the above warnings should still be considered.

For point sources, EIS format is maintained throughout FREDS. This allows QA checks to be performed on the temporal, species, and spatial allocation factors in addition to QA of the emission records themselves. File size reduction was not as pertinent for point sources as there are considerably fewer records than are in the area source file.

When using the NCC-IBM, the JES2 job log should be checked to ensure proper tape mounting, verify volume numbers, ensure that no system problems were encountered, and verify that output data sets have been catalogued. In addition, the user should always check the SAS job log and diagnostic report for each module to determine possible SAS, file, or data errors. If a detail level of "T" has been specified for the area source diagnostic report, emissions totals should be checked for validity. The Control Options File summarized in the diagnostic report should be checked to ensure the proper specifications were requested. The job log should be checked and printed or explicitly saved within 3 days to avoid deletion from the queue before the output has been checked.

For all modules, the user should check all input and output files for valid numbers of variables and observations. If an output data set from one module is directly input to another, the SAS file statistics should be compared for accuracy. If a partial listing of output data is preferred for checking purposes, the SAS option, OBS = # of observations, may be employed along with the detailed report option.

Warning messages in MDEM and TAM should be evaluated to determine possible file problems or data errors. Orphaned data sets should also be checked for possible data errors. Since the area source TAM has the flexibility of processing gridded or county-level emissions, the user should be aware of possible space problems when generating hourly, speciated emissions by SCC, State, and County for the entire U.S.; e.g., gridded U.S. data which normally occupies two 9-track 6250 BPI magnetic tapes requires 17 tapes when resolved by SCC, State, and County.

In calculating spatial allocation factors to be used for input to SAM, the user is limited to 160 grids per county and up to 30 spatial allocation categories by the spatial factor software and the Spatial Allocation Factor Preprocessor program (SAFP). For U.S. area sources allocated to 20 x 20 km grid cells, this should not present any problems since grid cells may be allocated from the county level. For data sets where grid cells must be defined for a larger area (for example, the provincial level of Canada) or smaller grid cell sizes are requested (e.g., 5 x 5 km), the number of grids may exceed the limit.

For final processing (MIP), the user should check the summary statistics to ensure the correct files have been combined in the generation of the modeler's tape. The number of observations and variables input and output should be checked for validity. It is especially important to check the JES2 job log for this module to ensure tape volumes have been properly mounted and catalogued. If output tape data sets are to be used by programs not written in SAS, they must be converted to the user-requested format. For the 1980 inventory, the SAS output is standardly converted to EBCDIC characters.

SECTION 7

ENVIRONMENT

The operating environment for each module of FREDS is described below for execution on EPA's National Computer Center IBM 3090. The description of the files accessed includes DD labels, device (disk or tape), the class of the file (permanent or temporary), and the I/O status. The device specified describes that most frequently used in processing the 1980 NAPAP Emission Inventories. The region size for each module is discussed with respect to the SAS default region--1536K for SAS version 5.08 and 600K for SAS version 82.4. None of the modules require specification of an increased region size for execution. Examples of CPU times for "typical" point and area source subfiles and different pollutant species scenarios are also given for each module.

MODEL DATA EXTRACTION MODULE

Point Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
TEMP	Tape	Temporary	Intermediate
EISMF	Tape	Permanent	Input
MAJOR	Tape	Permanent	Output
MINOR	Disk	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Processing of 50,233 point source records (all U.S. point sources) reporting 11 annual pollutant emissions required 20.49 CPU seconds. A summary of computing costs is given at the end of this section.

Area Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
TEMP	Disk	Temporary	Intermediate
EISMF	Tape	Permanent	Input
AREA	Tape	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Processing of 245,405 area source records (all U.S. area sources) and extracting 11 annual pollutants required a CPU time of 1 minute 16.23 seconds. A summary of computing costs for area source processing is also given at the end of this section.

TEMPORAL ALLOCATION MODULE

Point Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
WORK	Disk	Temporary	Intermediate
TEMP	Tape	Temporary	Intermediate
TEMP1	Disk	Temporary	Intermediate
TEMP2	Disk	Temporary	Intermediate
TEMP3	Disk	Temporary	Intermediate
TEMP4	Disk	Temporary	Intermediate
TEMP5	Disk	Temporary	Intermediate
INFILE	Tape	Permanent	Input
TZF	Disk	Permanent	Input
TAFF	Disk	Permanent	Input
OUTFILE	Tape	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Temporal allocation of all U.S. point sources (50,159) for 23 pollutants required a CPU time of 2 minutes 11.70 seconds. For 50,159 point sources and 11 pollutants, a CPU time of 1 minute 56.83 seconds was required.

Area Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
TEMP	Tape	Temporary	Intermediate
SORTIN	Tape	Temporary	Intermediate

DD Label	Device	Class	I/O
TAMIN	Tape	Permanent	Input
TAFF	Disk	Permanent	Input
STATE	Tape	Temporary	Intermediate
SCC	Tape	Temporary	Intermediate
SORTOUT,FT11F001	Tape	Temporary	Intermediate (SYNCSORT output, MTPREP.FORT input)
SORTWKnn	Disk	Temporary	Intermediate
FT10F001	Disk	Permanent	Input (to MTPREP.FORT)
FT20F001,INFILE	Tape	Temporary	Intermediate (MTPREP.FORT output, MTPREP.SAS input)
OUTFILE	Tape	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Processing of 42 pollutants and 862,453 area source emission records (about 1/4 of all spatially allocated U.S. area source records for winter weekday) required CPU times for the job steps as follows: TAM, 14 minutes 36.86 seconds; SYNCSORT, 58.87 seconds; MTPREP.FORT, 33 minutes 39.99 seconds; MTPREP.SAS, 1 minute 14.51 seconds. For 23 pollutants and 862,453 records, CPU times are as follows: TAM, 11 minutes 17.13 seconds; SYNCSORT, 44.05 seconds; MTPREP.FORT, 21 minutes 11.85 seconds; MTPREP.SAS, 42.32 seconds.

SPECIATION MODULE

Point Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
INFILE	Tape	Permanent	Input
SFF	Disk	Permanent	Input
PSLIT	Disk	Permanent	Input
OUTFILE1	Tape	Permanent	Output
OUTFILE2	Disk	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Speciation of 11 annual pollutants into 23 species for all U.S. point sources (50,156) required a CPU time of 9.61 seconds. Speciation of these same point sources into 42 species required 24.77 seconds CPU time.

Area Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
INFILE	Tape	Permanent	Input
SFF	NA	NA*	Dummy File
PSPLIT	Disk	Permanent	Input
SAROAD	Disk	Permanent	Input
TZF	Disk	Permanent	Input
SMOUT	Tape	Permanent	Output
ORPHAN	Disk	Permanent	Output

*Not Applicable for area sources in the 1980 NAPAP inventory.

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Speciation of 11 annual pollutants into 23 species for all U.S. area source records (245,505) required a CPU time of 1 minute 38.79 seconds. To speciate 11 annual pollutants into 42 species for 245,505 emission records required 2 minutes 24.41 seconds CPU time.

SPATIAL ALLOCATION MODULE

Point Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
INFILE	Tape	Permanent	Input
OUTFILE1	Tape	Permanent	Output
OUTFILE2	Disk	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Spatial allocation of 50,159 point sources (complete U.S. point source file) and 11 annual pollutants required 6.49 seconds CPU time.

Area Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
SAMIN	Tape	Permanent	Input
SAFF	Tape	Permanent	Input
SAFFIN	Disk	Temporary	Intermediate
SAFFOUT	Disk	Temporary	Intermediate
SAMOUT	Tape	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: Spatial allocation of 1,000,000 spatial allocation factor records for U.S. area sources (about 1/4 of the total spatial allocation factor file) and 23 speciated pollutants required a CPU time of 5 minutes 59.23 seconds. To spatially allocate 1,000,000 records and 42 speciated pollutants required 8 minutes 22.06 seconds CPU time.

MODEL INPUT PREPROCESSOR

Point Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
IN1	Tape	Permanent	Input
IN2	Tape	Permanent	Input
INn	Tape	Permanent	Input
MIPIN	Tape	Temporary	Intermediate
MIPOUT	Tape	Permanent	Output
INFILE	Tape	Permanent	Input, intermediate
FILE1	Tape	Permanent	Output

2. Region Size: SAS version 5.08 default.

3. Timing Estimates: To combine 52,860 point source records (U.S. and Canada total files) into a SAS modeler's tape for 23 pollutants required a CPU time of 1 minute 7.72 seconds. For 42 pollutants and 52,860 point sources, 1 minute 10.25 seconds CPU time was required. Conversion from SAS format to EBCDIC characters used 5 minutes 7.46 seconds CPU for 23 pollutants and 5 minutes 43.23 seconds CPU for 42.

Area Sources

1. Files Accessed:

DD Label	Device	Class	I/O
COF	Disk	Permanent	Input
IN1	Tape	Permanent	Input, intermediate
IN2	Tape	Permanent	Input, intermediate
IN3	Tape	Permanent	Input, intermediate
MIPIN	Tape	Temporary	Intermediate
MIPOUT	Tape	Permanent	Output
MIPBACK	Tape	Permanent	Output
INFILE	Tape	Permanent	Input, intermediate
FILE1	Tape	Permanent	Output
FILE2	Tape	Permanent	Output

2. Region Size: SAS version 82.4 default.

3. Timing Estimates: To combine 620,784 area source emissions records (complete modeler's tape for U.S. and Canada - winter weekday) for 23 pollutants required a CPU time of 15 minutes 54.43 seconds. For 42 pollutants, the same number of area source records required 26 minutes 24.96 seconds CPU time. Conversion from SAS format to EBCDIC characters used 3 minutes 28.58 seconds CPU for 23 pollutants and 5 minutes 27.71 seconds for 42 pollutants.

SUMMARY OF COMPUTING COSTS

The following subsections present computing costs for point and area source FREDS executions, based on the 1980 NAPAP inventory processing. Point source estimates are given for NAPAP Versions 5.0, 5.2, and 5.3 for U.S. and Canada for all twelve scenarios. Area source estimates are supplied for Version 5.0 and Versions 5.2 and 5.3 for a "typical" winter weekday. For the U.S., TAM runs the computing cost is for approximately 1/4 of the spatially allocated area source file (i.e., four TAM executions are required to temporally allocate U.S. area sources for one scenario); computing costs for Canadian area sources reflect the entire Canadian area source data base. MIP computing costs reflect the entire U.S. and Canadian area source data bases.

NAPAP Version 5.0 - Point Sources

Module	Step	CPU Time Per Run* (min:sec)	Priority Factor*	Total Cost* ($)
SAS-EBCDIC - U.S.	1	:50.12	1.0	20.44
SAS-EBCDIC - Canada	1	:02.18	1.0	1.53
MDEM - U.S.	1	:20.49	1.5	18.44
MDEM - Canada	1	:01.69	1.0	1.27
SAM - U.S.	1	:06.49	1.0	4.72
SAM - Canada	1	:01.11	1.0	0.72

NAPAP Version 5.0 - Area Sources

Module	Step	CPU Time Per Run* (min:sec)	Priority Factor*	Total Cost* ($)
SAS-EBCDIC - U.S.	1	5:12.33	1.0	120.64
SAS-EBCDIC - Canada	1	:00.95	1.0	0.48
MDEM - U.S.	1	1:16.23	1.0	41.51
MDEM - Canada	1	:01.70	1.5	1.24

NAPAP Version 5.2 - Point Sources

Module	Step	CPU Time Per Run* (min:sec)	Priority Factor*	Total Cost* ($)
SM - U.S.	1	:24.77	1.5	31.21
SM - Canada	1	:04.63	1.5	4.60
TAM - U.S.	1	1:56.83	1.5	91.29
TAM - Canada	1	:10.25	1.5	8.29
MIP	1	1:10.25	1.5	106.83
SAS-EBCDIC	1	5:43.23	1.0	113.41

NAPAP Version 5.2 - Area Sources

Module	Step	CPU Time Per Run* (min:sec)	Priority Factor*	Total Cost* ($)
SM - U.S.	1	2:24.41	1.5	84.79
SM - Canada	1	:03.97	1.0	1.77
SAM - US1	1	8:22.06	1.5	268.71
SAM - US2	1	9:02.15	1.5	286.42
SAM - US3	1	9:43.08	1.5	305.14
SAM - US4	1	7:59.55	1.5	246.95
SAM - Canada[a]	1	3:10.34	1.5	100.00
TAM - US1[b]	1	14:36.86	1.5	509.23
	2	:58.87	1.5	39.32
	3	33:39.99	1.5	926.77
	4	1:14.51	1.5	39.13
TAM - Canada	1	7:50.08	1.5	272.05
	2	1:02.28	1.5	68.90
	3	21:12.82	1.5	584.78
	4	:56.71	1.5	30.04
MIP	1-3	26:24.96	1.5	1016.51
SAS-EBCDIC	1	5:27.71	1.0	119.88

NAPAP Version 5.3 - Point Sources

Module	Step	CPU Time Per Run* (min:sec)	Priority Factor*	Total Cost* ($)
SM - U.S.	1	:09.61	1.0	6.51
SM - Canada	1	:02.86	1.0	1.58
TAM - U.S.	1	2:11.70	1.0	73.29
TAM - Canada	1	:11.13	1.0	6.33
MIP		1:07.72	1.0	65.55
SAS-EBCDIC		5:07.46	1.0	100.33

NAPAP Version 5.3 - Area Sources

Module	Step	CPU Time Per Run* (min:sec)	Priority Factor*	Total Cost* ($)
SM - U.S.	1	1:38.79	1.5	61.43
SM - Canada	1	:03.87	1.0	1.68
SAM - US1	1	5:59.23	1.5	192.81
SAM - US2	1	6:39.62	1.5	210.77
SAM - US3	1	7:17.37	1.5	227.99
SAM - US4	1	6:12.90	c	c
SAM - Canada[a]	1	2:30.19	1.5	78.71
TAM - US1[b]	1	11:17.13	1.0	254.19
	2	:44.05	1.0	18.66
	3	21:11.85	1.0	390.31
	4	:42.32	1.0	15.37
TAM - Canada	1	6:41.12	1.0	147.58
	2	:27.70	1.0	11.38
	3	13:50.78	1.0	254.91
	4	:33.78	1.0	12.28
MIP	1-3	15:54.43	1.0	337.69
SAS-EBCDIC	1	3:28.58	1.0	78.87

---

*These figures are taken from the 1980 NAPAP FREDS runs.

[a] Spatial allocation of Canadian area sources used a modified version of SAM for 1980 processing.

[b] TAM-US1 computing statistics are for a "typical" winter weekday. TAM-US1 represents approximately 1/4 of the spatially allocated U.S. area source file -- four TAM executions are required to temporally allocate U.S. area sources.

[c] Priority and cost statistics for this segment were not available.

SECTION 8

EXAMPLE SPECIATION MODULE RUN AND DESCRIPTION

Since the completion of the FREDS software, point and area source modeler's tapes have been produced for the 1980 NAPAP Emissions Inventory. To present a sample run of all FREDS modules would be both cumbersome and redundant since the runstreams are provided in Section 3 and the job output from each module is presented in Section 4. Instead, an example run of one module, the Speciation Module (SM) for Version 5.3 area source emissions, is provided on the following pages.

The module run example consists of the Control Options File, JCL runstream, and job output. For a description of the emissions data, refer to Section 4--Input/Output Format Descriptions. The SM speciates THC into 10 photochemical reactivity classes by carbon bond IV chemistry and NO_x into NO and NO_2. The job output presented is segmented into three sections: JES2 Job Log (Segment 1), SAS Job Log (Segment 2) and diagnostic report (Segment 3).

The JES2 Job Log is printed for all batch jobs submitted to the NCC-IBM. It contains job statistics such as allocation of disk space and tape drives, volume serial numbers for temporary and permanent tapes, cataloging procedures for permanent data sets, and CPU time. The SAS Job Log summarizes SAS procedures executed by each job step. The last segment, the diagnostic report, summarizes the actions of the Speciation Module. In this example, a detailed report was requested, and so a listing of the speciated emissions is also included.

CONTROL OPTIONS FILE

```
00010 1 AS D     DATA 1980 NAPAP 5.3 INVENTORY - U.S. AREA SOURCES
00020 2     ATHC 10
00030 2     ANOX 02
```

EXECUTION DECK

```
//xxxSM JOB (aaaafimas,Mxxx,,49),LGL,NOTIFY=xxx,TIME=(,30)
/*ROUTE PRINT HOLD
//*********************************************************************
//*********************************************************************
//*
//*   APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)
//*
//*   PROGRAM: SPECIATION MODULE (SM)
//*
//*   LANGUAGE: OS JCL (SYSTEM 370)
//*
//*   PURPOSE: TO EXECUTE THE SAS CODE FOR SM, PROVIDING THE
//*            FILENAMES AND PARAMETERS NECESSARY
//*
//* PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, AUGUST 1985
//*
//*********************************************************************
//*********************************************************************
//*
//*   INSTRUCTIONS: MODIFY THE RUNSTREAM TO RUN MDEM AS FOLLOWS:
//*
//*       1. CALCULATE TIME REQUIREMENT
//*       2. PROVIDE FILE NAMES TO DD LABELS AS FOLLOWS
//*
//*           DD LABEL           FILE DESCRIPTION
//*          -------------------------------------------------------------
//*           COF        CONTROL OPTIONS FILE
//*           INFILE     EMISSION FILE (INPUT)
//*           SMOUT      SPECIATED EMISSION SUBFILE LIBRARY (OUTPUT)
//*           ORPHAN     SM ORPHAN EMISSION FILE
//*           SFF        SPECIATION FACTOR FILE
//*           PSPLIT     PSPLIT OUTPUT FILE
//*           SAROAD     POLLUTANT CLASS DESCRIPTION FILE
//*           SYSIN      SM SAS SOURCE CODE
//*
//*       3. CALCULATE SPACE REQUIREMENTS FOR OUTPUT FILE
//*       4. SUBMIT
//*
//*********************************************************************
//*********************************************************************
//*
//*     NAPAP 5.3 INVENTORY-AREA SOURCES U.S.
//*
//SM   EXEC SAS,OPTIONS='MACRO OBS=100'
//SYSIN DD DSN=xxxaaaa.SM.VER1.SAS,DISP=SHR
//TZF DD DSN=xxxaaaa.TAM.TZFUSA.DATA,DISP=SHR
//WORK DD UNIT=SYSDA,SPACE=(TRK,(600,150),RLSE)
//COF DD DSN=xxxaaaa.SM.COF.ASUSA,DISP=SHR
//INFILE DD DSN=xxxaaaa.NAPAP50.MDEMOUT.ASUSA.DATA,DISP=SHR
//SMOUT DD DSN=xxxaaaa.SMOUT.SAMPLE.ASUSA.DATA,
//            UNIT=DISK,SPACE=(TRK,(600,100),RLSE),
//            DISP=(NEW,CATLG,DELETE)
//ORPHAN DD DSN=xxxaaaa.SM53.SAMPLE.ORPHAN.ASUSA.DATA,
//        DISP=(NEW,CATLG,DELETE),UNIT=DISK,SPACE=(TRK,(400,100),RLSE)
//SFF DD DUMMY
//PSPLIT DD DSN=xxxaaaa.SM.PSPLIT53.ASUSA.DATA,DISP=SHR
//SAROAD DD DSN=xxxaaaa.FREDS53.SAROAD.DATA,DISP=SHR
//
```

OUTPUT

```
                       J E S 2  J O B  L O G  --  S Y S T E M  E P A 2  --  N O D E  N C C I B M 1
  -------- JOB 5222  IEF097I xxxSM    - USER xxx      ASSIGNED
  13.28.34 JOB 5222  ICH70001I xxx     LAST ACCESS AT 09:44:12 ON THURSDAY, JULY 16, 1987
  13.28.35 JOB 5222  $HASP373 xxxSM   STARTED - INIT  9 - CLASS B - SYS EPA2
  13.32.02 JOB 5222  NCC005I * JOB xxxSM    ENDED 07/16/87 AT 13:32:02, PRTY=04, CC=0000
  13.32.02 JOB 5222  $HASP395 xxxSM   ENDED
  ------ JES2 JOB STATISTICS ------
   16 JUL 87 JOB EXECUTION DATE
          59 CARDS READ
         597 SYSOUT PRINT RECORDS
           0 SYSOUT PUNCH RECORDS
          43 SYSOUT SPOOL KBYTES
        3.47 MINUTES EXECUTION TIME
      1     //xxxSM JOB (aaaaACIDP,Mxxx,,49),LGL,NOTIFY=xxx,TIME=(,30),           JOB 5222
            // PRTY=4                                                             00000015
            ***ROUTE PRINT HOLD                                                    0000002
            ************************************************************************00000030
            ************************************************************************00000040
                                                                                    00000050
            ***                                                                     00000060
            ***   APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)      00000070
            ***                                                                     00000080
            ***   PROGRAM: SPECIATION MODULE (SM)                                   00000090
            ***                                                                     00000100
            ***   LANGUAGE: OS JCL (SYSTEM 370)                                     00000110
            ***                                                                     00000120
            ***   PURPOSE: TO EXECUTE THE SAS CODE FOR SM, PROVIDING THE            00000130
            ***            FILENAMES AND PARAMETERS NECESSARY                       00000140
            ***                                                                     00000150
            *** PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, AUGUST 198500000150
            ***                                                                     00000160
            ************************************************************************00000170
            ************************************************************************00000180
                                                                                    00000190
            ***                                                                     00000200
            ***   INSTRUCTIONS: MODIFY THE RUNSTREAM TO RUN MDEM AS FOLLOWS:        00000210
            ***                                                                     00000220
            ***       1. CALCULATE TIME REQUIREMENT                                 00000240
            ***       2. PROVIDE FILE NAMES TO DD LABELS AS FOLLOWS                 00000250
            ***                                                                     00000260
            ***            DD LABEL            FILE DESCRIPTION                     00000270
            ***           ----------------------------------------------------------00000270
            ***            COF        CONTROL OPTIONS FILE                          00000280
            ***            INFILE     EMISSION FILE (INPUT)                         00000290
            ***            SMOUT      SPECIATED EMISSION SUBFILE LIBRARY (OUTPUT)   00000300
            ***            ORPHAN     SM ORPHAN EMISSION FILE                       00000301
            ***            SFF        SPECIATION FACTOR FILE                        00000310
            ***            PSPLIT     PSPLIT OUTPUT FILE                            00000320
            ***            SAROAD     POLLUTANT CLASS DESCRIPTION FILE              00000321
            ***            SYSIN      SM SAS SOURCE CODE                            00000330
            ***                                                                     00000340
            ***       3. CALCULATE SPACE REQUIREMENTS FOR OUTPUT FILE               00000350
            ***       4. SUBMIT                                                     00000360
            ***                                                                     00000370
            ************************************************************************00000380
            ************************************************************************00000390
                                                                                    00000391
            ***                                                                     00000392
            ***     NAPAP 5.3 INVENTORY-AREA SOURCES U.S.                           00000393
            ***                                                                     00000400
      2     //SM    EXEC SAS,OPTIONS='MACRO OBS=100'                                00010000
      3     XXSAS   PROC ENTRY=SASLPA,OPTIONS=,SORT=4,GREGION=1536K,                00020000
            XX           PRINT=A,
          XX          PLRECL=255,      > 255 CAUSES PROBLEMS WITH QED/ISPF EDITOR 00030000
          XX          ADABAS=DDCARD    EXTRACTA DEFAULT TO PADABAS                00040000
          ************************************************************************ 00050000
          ***  PRODUCT: OS SAS RELEASE 5.16                                    *** 00060000
          ***  DOCUMENTATION: SAS USER'S GUIDE: BASICS, VERSION 5 EDITION      *** 00070000
          ***                 SAS USER'S GUIDE: STATISTICS, VERSION 5 EDITION *** 00080000
          ***                 SAS TECHNICAL REPORT: P-146  CHANGES AND         *** 00090000
          ***                    ENHANCEMENTS TO THE VERSION 5 SAS SYSTEM      *** 00100000
          ***  FROM: SAS INSTITUTE INC., BOX 8000, CARY, NC  27511-8000        *** 00110000
          ************************************************************************ 00120000
     4    XXSAS     EXEC PGM=&ENTRY,PARM='&OPTIONS SORT=&SORT',REGION=&GREGION     00130000
          IEF653I SUBSTITUTION JCL - PGM=SASLPA,PARM='MACRO OBS=100 SORT=4',REGION=1536K
     5    XXLIBRARY   DD DISP=(MOD,PASS),DSN=&LIBRARY,                             00140000
          XX             UNIT=SYSDR,SPACE=(CYL,(1,,20))                            00150000
     6    XXSTEPLIB   DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.LIBRARY                     00160000
     7    XX          DD DISP=SHR,DSN=SYS1.PLIBASE                                 00170000
     8    XX          DD DISP=(OLD,PASS),DSN=*.LIBRARY,VOL=REF=*.LIBRARY           00180000
     9    XXMAPS      DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.MAPS                        00190000
    10    XXSASUTL    DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.UTILLIB                     00200000
    11    XXSASHELP   DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.SASHELP                     00210000
    12    XXSASAUTOS  DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.MACAUTOS                    00220000
    13    XXEXTPARM   DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.EXTAPARM(EXTPARM)           00230000
    14    XXDDCARD    DD DISP=SHR,DSN=SYS2.SAS.V1R5M16.EXTAPARM(&ADABAS)           00240000
          IEF653I SUBSTITUTION JCL - DISP=SHR,DSN=SYS2.SAS.V1R5M16.EXTAPARM(DDCARD)
    15    XXWORK      DD UNIT=SYSDR,SPACE=(6160,(500,200),,,ROUND)                 00250000
    16    XXFT06F001  DD SYSOUT=&PRINT,DCB=(BLKSIZE=141,LRECL=137,RECFM=VBA)       00260000
          IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(BLKSIZE=141,LRECL=137,RECFM=VBA)
    17    XXFT11F001  DD SYSOUT=&PRINT,DCB=(BLKSIZE=141,LRECL=137,RECFM=VBA)       00270000
          IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(BLKSIZE=141,LRECL=137,RECFM=VBA)
    18    XXFT12F001  DD SYSOUT=&PRINT,DCB=(BLKSIZE=264,LRECL=&PLRECL,RECFM=VBA)   00280000
          IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(BLKSIZE=264,LRECL=255,RECFM=VBA)
    19    XXFT13F001  DD SYSOUT=B,DCB=(RECFM=F,BLKSIZE=80)                         00290000
          ***FT14F001  DD DUMMY **THIS DD STATMENT USED FOR CALCOMP PLOTTER JOBS   00300000
    20    XXFT15F001  DD UNIT=SYSDR,SPACE=(400,(100,300)),                         00310000
          XX             DCB=(RECFM=FB,LRECL=80,BLKSIZE=400,BUFNO=1)               00320000
    21    XX$ORTPARM   DD DSN=SYS1.PRODPROC(SASSORTP),DISP=SHR                     00330000
    22    //SYSIN DD DSN=aaaa.SM.VER1.SAS,DISP=SHR                                 00000410
    23    //TZF DD DSN=xxxaaaa.TAM.TZFUSA.DATA,DISP=SHR                            00000411
    24    //WORK DD UNIT=SYSDA,SPACE=(TRK,(600,150),RLSE)                          00000412
    25    //COF DD DSN=xxxaaaa.SAMPLE.SM.COF.ASUSA,DISP=SHR                        00000420
    26    //INFILE DD DSN=xxxaaaa.NAPAP50.MDEMOUT.ASUSA.DATA,DISP=SHR               00000430
    27    //SMOUT DD DSN=xxxaaaa.SMOUT.SAMPLE.ASUSA.DATA,                          00000460
          //            UNIT=DISK,SPACE=(TRK,(600,100),RLSE),                      00000470
          //            DISP=(NEW,CATLG,DELETE)                                    00000471
    28    //ORPHAN DD DSN=xxxaaaa.SM53.SAMPLE.ORPHAN.ASUSA.DATA,                   00000490
          //        DISP=(NEW,CATLG,DELETE),UNIT=DISK,SPACE=(TRK,(400,100),RLSE)   00000500
    29    //SFF DD DUMMY                                                           00000520
    30    //PSPLIT DD DSN=aaaa.SM.PSPLIT53.ASUSA.DATA,DISP=SHR                     00000530
    31    //SAROAD DD DSN=xxxaaaa.FREDS53.SAROAD.DATA,DISP=SHR                     00000531
          //                                                                       00000540
ICH70001I xxx      LAST ACCESS AT 09:44:12 ON THURSDAY, JULY 16, 1987
IEF236I ALLOC. FOR xxxSM SAS SM
IEF237I 809  ALLOCATED TO LIBRARY
IEF237I 83D  ALLOCATED TO STEPLIB
IEF237I 86F  ALLOCATED TO
IEF237I 809  ALLOCATED TO
IEF237I 86B  ALLOCATED TO SYS00724
IEF237I 95B  ALLOCATED TO MAPS
IEF237I 87F  ALLOCATED TO SASUTL
IEF237I 87F  ALLOCATED TO SASHELP
```

```
IEF237I 87F  ALLOCATED TO SASAUTOS
IEF237I 95B  ALLOCATED TO EXTPARM
IEF237I 95B  ALLOCATED TO DDCARD
IEF237I 81D  ALLOCATED TO WORK
IEF237I JES2 ALLOCATED TO FT06F001
IEF237I JES2 ALLOCATED TO FT11F001
IEF237I JES2 ALLOCATED TO FT12F001
IEF237I JES2 ALLOCATED TO FT13F001
IEF237I 8D0  ALLOCATED TO FT15F001
IEF237I 83D  ALLOCATED TO $ORTPARM
IEF237I 87D  ALLOCATED TO SYSIN
IEF237I 86B  ALLOCATED TO SYS00726
IEF237I 844  ALLOCATED TO TZF
IEF237I 977  ALLOCATED TO SYS00728
IEF237I 971  ALLOCATED TO WORK
IEF237I 942  ALLOCATED TO COF
IEF237I 943  ALLOCATED TO INFILE
IEF237I 88F  ALLOCATED TO SYS00730
IEF237I 84C  ALLOCATED TO SMOUT
IEF237I 84D  ALLOCATED TO ORPHAN
IEF237I DMY  ALLOCATED TO SFF
IEF237I 892  ALLOCATED TO PSPLIT
IEF237I 946  ALLOCATED TO SAROAD
IEF237I JES2 ALLOCATED TO SYSOUT
IEF237I 941  ALLOCATED TO SASSWK01
IEF237I 8C1  ALLOCATED TO SASSWK02
IEF237I 881  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T132906.RA000.xxxSM.R0000000         DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T132906.RA000.xxxSM.R0000001         DELETED
IEF285I   VOL SER NOS= WORK86.
IEF285I   SYS87197.T132907.RA000.xxxSM.R0000002         DELETED
IEF285I   VOL SER NOS= WORK84.
IEF237I 941  ALLOCATED TO SASSWK01
IEF237I 881  ALLOCATED TO SASSWK02
IEF237I 8C1  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T132921.RA000.xxxSM.R0000003         DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T132922.RA000.xxxSM.R0000004         DELETED
IEF285I   VOL SER NOS= WORK84.
IEF285I   SYS87197.T132923.RA000.xxxSM.R0000005         DELETED
IEF285I   VOL SER NOS= WORK86.
IEF237I 941  ALLOCATED TO SASSWK01
IEF237I 861  ALLOCATED TO SASSWK02
IEF237I 8C1  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T132934.RA000.xxxSM.R0000006         DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T132935.RA000.xxxSM.R0000007         DELETED
IEF285I   VOL SER NOS= WORK83.
IEF285I   SYS87197.T132936.RA000.xxxSM.R0000008         DELETED
IEF285I   VOL SER NOS= WORK86.
IEF237I 941  ALLOCATED TO SASSWK01
IEF237I 861  ALLOCATED TO SASSWK02
IEF237I 8C1  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T132959.RA000.xxxSM.R0000009         DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T132959.RA000.xxxSM.R0000010         DELETED
IEF285I   VOL SER NOS= WORK83.
IEF285I   SYS87197.T133000.RA000.xxxSM.R0000011         DELETED
IEF285I   VOL SER NOS= WORK86.
```

```
IEF237I 881  ALLOCATED TO SASSWK01
IEF237I 941  ALLOCATED TO SASSWK02
IEF237I 8C1  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T133031.RA000.xxxSM.R0000012       DELETED
IEF285I   VOL SER NOS= WORK84.
IEF285I   SYS87197.T133033.RA000.xxxSM.R0000013       DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T133034.RA000.xxxSM.R0000014       DELETED
IEF285I   VOL SER NOS= WORK86.
IEF237I 941  ALLOCATED TO SASSWK01
IEF237I 861  ALLOCATED TO SASSWK02
IEF237I 8C1  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T133108.RA000.xxxSM.R0000015       DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T133109.RA000.xxxSM.R0000016       DELETED
IEF285I   VOL SER NOS= WORK83.
IEF285I   SYS87197.T133110.RA000.xxxSM.R0000017       DELETED
IEF285I   VOL SER NOS= WORK86.
IEF237I 861  ALLOCATED TO SASSWK01
IEF237I 941  ALLOCATED TO SASSWK02
IEF237I 8C1  ALLOCATED TO SASSWK03
IEF285I   SYS87197.T133129.RA000.xxxSM.R0000018       DELETED
IEF285I   VOL SER NOS= WORK83.
IEF285I   SYS87197.T133130.RA000.xxxSM.R0000019       DELETED
IEF285I   VOL SER NOS= WORK85.
IEF285I   SYS87197.T133133.RA000.xxxSM.R0000020       DELETED
IEF285I   VOL SER NOS= WORK86.
IEF142I xxxSM SAS SM - STEP WAS EXECUTED - COND CODE 0000
IEF285I   SYS87197.T132834.RA000.xxxSM.LIBRARY        PASSED
IEF285I   VOL SER NOS= WORK82.
IEF285I   SYS2.SAS.V1R5M16.LIBRARY                    KEPT
IEF285I   VOL SER NOS= PLIB03.
IEF285I   SYS1.PLIBASE                                KEPT
IEF285I   VOL SER NOS= MV2RES.
IEF285I   SYS87197.T132834.RA000.xxxSM.LIBRARY        PASSED
IEF285I   VOL SER NOS= WORK82.
IEF285I   CATALOG.VUCAT01A                            KEPT
IEF285I   VOL SER NOS= UCAT10.
IEF285I   SYS2.SAS.V1R5M16.MAPS                       KEPT
IEF285I   VOL SER NOS= PLIB01.
IEF285I   SYS2.SAS.V1R5M16.UTILLIB                    KEPT
IEF285I   VOL SER NOS= PLIB02.
IEF285I   SYS2.SAS.V1R5M16.SASHELP                    KEPT
IEF285I   VOL SER NOS= PLIB02.
IEF285I   SYS2.SAS.V1R5M16.MACAUTOS                   KEPT
IEF285I   VOL SER NOS= PLIB02.
IEF285I   SYS2.SAS.V1R5M16.EXTAPARM                   KEPT
IEF285I   VOL SER NOS= PLIB01.
IEF285I   SYS2.SAS.V1R5M16.EXTAPARM                   KEPT
IEF285I   VOL SER NOS= PLIB01.
IEF285I   SYS87197.T132834.RA000.xxxSM.R0000001       DELETED
IEF285I   VOL SER NOS= WORK87.
IEF285I   JES2.JOB05222.S0000101                      SYSOUT
IEF285I   JES2.JOB05222.S0000102                      SYSOUT
IEF285I   JES2.JOB05222.S0000103                      SYSOUT
IEF285I   JES2.JOB05222.S0000104                      SYSOUT
IEF285I   SYS87197.T132834.RA000.xxxSM.R0000002       DELETED
IEF285I   VOL SER NOS= WORK88.
IEF285I   SYS1.PRODPROC                               KEPT
IEF285I   VOL SER NOS= PLIB03.
```

```
IEF285I   aaaa.SM.VER1.SAS                                  KEPT
IEF285I   VOL SER NOS= USR011.
IEF285I   CATALOG.VUCAT01B                                  KEPT
IEF285I   VOL SER NOS= UCAT10.
IEF285I   xxxaaaa.TAM.TZFUSA.DATA                           KEPT
IEF285I   VOL SER NOS= USR131.
IEF285I   CATALOG.VUCAT03C                                  KEPT
IEF285I   VOL SER NOS= UCAT30.
IEF285I   SYS87197.T132834.RA000.xxxSM.R0000003             DELETED
IEF285I   VOL SER NOS= WORK81.
IEF285I   xxxaaaa.SAMPLE.SM.COF.ASUSA                       KEPT
IEF285I   VOL SER NOS= USR107.
IEF285I   xxxaaaa.NAPAP50.MDEMOUT.ASUSA.DATA                 KEPT
IEF285I   VOL SER NOS= USR108.
IEF285I   CATALOG.VUCAT02B                                  KEPT
IEF285I   VOL SER NOS= UCAT20.
IEF285I   xxxaaaa.SMOUT.SAMPLE.ASUSA.DATA                   CATALOGED
IEF285I   VOL SER NOS= USR015.
IEF285I   xxxaaaa.SM53.SAMPLE.ORPHAN.ASUSA.DATA             CATALOGED
IEF285I   VOL SER NOS= USR135.
IEF285I   aaaa.SM.PSPLIT53.ASUSA.DATA                       KEPT
IEF285I   VOL SER NOS= USR059.
IEF285I   xxxaaaa.FREDS53.SAROAD.DATA                       KEPT
IEF285I   VOL SER NOS= USR127.
IEF285I   JES2.JOB05222.S0000105                            SYSOUT
NCC950I ****************** U.S.EPA  SYSTEM EPA2 - STEP SUMMARY *****************
NCC949I *                                                                       *
NCC950I * JOB xxxSM      STEP SAS                                    CC:  0000  *
NCC949I *                                                                       *
NCC950I *  START THURSDAY  07/16/87 AT 13:28:35   STOP 07/16/87 AT 13:32:02      *
NCC950I *     3:27.46 ELAPSED    0:03.48 TCB    0:00.34 SRB    0:03.82 TOT CPU  *
NCC949I *                                                                       *
NCC949I *                                                                       *
NCC950I *  MEMORY:      OK VIRTUAL ADDRESS SPACE,        10696K                  *
NCC950I *  EXCPS:       808 DA,         0 MT,         0 OTHER,         808 TOTAL  *
NCC950I *  EXCPS BY UNIT:    809:          0     83D:         75   86F:         0  *
NCC950I *  809:         0    86B:          0     95B:          0   87F:         0  *
NCC950I *  87F:         0    87F:          0     95B:          0   95B:         0  *
NCC950I *  81D:       599    000:          0     000:          0   000:         0  *
NCC950I *  000:         0    8D0:          0     83D:         21   87D:        13  *
NCC950I *  86B:         0    844:          4     977:          0   971:         0  *
NCC950I *  942:         2    943:         20     88F:          0   84C:        26  *
NCC950I *  84D:        44    000:          0     892:          2   946:         2  *
NCC950I *  000:         0    86B:          0     86B:          0   977:         0  *
NCC950I *  88F:         0    941:          0     8C1:          0   881:         0  *
NCC950I *  881:         0    8C1:          0     861:          0   881:         0  *
NCC950I *  941:         0    861:          0                                      *
NCC950I *  PAGES IN:             0 VIO          40 SWAP          81 OTHER        *
NCC950I *  PAGES OUT:            0 VIO          49 SWAP          85 OTHER        *
NCC950I *               278 PAGE SECONDS             190.75 RESIDENT SECONDS    *
NCC949I *                                                                       *
NCC950I *  CPU  :-    0:03.82  AT $1050./HR                          $2.22      *
NCC950I *  EXCPS:-         808  AT $.50/1000                         $ .80      *
NCC950I *  TOTAL COST FOR STEP SAS      AT PRTY=4   (2.0) =          $3.03      *
NCC949I *************************************************************************
IEF373I STEP /SAS     / START 87197.1328
IEF374I STEP /SAS     / STOP  87197.1332 CPU    0MIN 03.48SEC SRB    0MIN 00.34SEC VIRT  1536K SYS   316K EXT
IEF237I 809  ALLOCATED TO SYS00022                                                         4K SYS    8840K
IEF285I   SYS87197.T133202.RA000.xxxSM.R0000022         KEPT
IEF285I   VOL SER NOS= WORK82.
```

```
 IEF285I   SYS87197.T132834.RA000.xxxSM.LIBRARY          DELETED
 IEF285I   VOL SER NOS= WORK82.
 IEF285I   SYS87197.T132834.RA000.xxxSM.LIBRARY          KEPT
 IEF285I   VOL SER NOS= WORK82.
 NCC951I ****************** U.S.EPA  SYSTEM EPA2 - JOB SUMMARY ******************
 NCC949I *                                                                       *
 NCC951I * JOB xxxSM    0001 STEPS                                               *
 NCC949I *                                                       CC:  0000       *
 NCC951I *  SUBMIT THURSDAY  07/16/87 AT  9:52:11           216:23.16 ON QUEUE   *
 NCC951I *  START 07/16/87 AT 13:28:35              STOP 07/16/87 AT 13:32:02    *
 NCC951I *     3:27.72 ELAPSED    0:03.48 TCB    0:00.34 SRB    0:03.82 TOT CPU  *
 NCC949I *                                                                       *
 NCC949I *                                                                       *
 NCC951I *  CPU  :-    0:03.82  AT $1050./HR                                     *
 NCC951I *  EXCPS:-         808  AT $.50/1000                          $2.22     *
 NCC951I *  TOTAL COST FOR JOB  xxxSM    AT PRTY=4   (2.0) =           $ .80     *
 NCC949I **************************************************************$3.03*****
 IEF375I  JOB /xxxSM    / START 87197.1328
 IEF376I  JOB /xxxSM    / STOP  87197.1332 CPU    0MIN 03.48SEC SRB    0MIN 00.34SEC
 1          SAS(R) LOG   OS SAS 5.16            MVS/XA JOB xxxSM    STEP SM       PROC SAS     13:28 THURSDAY, JULY 16, 1987
NOTE: COPYRIGHT (C) 1984,1986 SAS INSTITUTE INC., CARY, N.C.  27511, U.S.A.
NOTE: THE JOB xxxSM HAS BEEN RUN UNDER RELEASE 5.16 OF SAS AT THE ENVIRONMENTAL PROTECTION AGENCY (01189001).
NOTE: CPUID   VERSION = 20  SERIAL = 170189  MODEL = 3090 .
      CPUID   VERSION = 20  SERIAL = 270189  MODEL = 3090 .
NOTE: SAS OPTIONS SPECIFIED ARE:
      MACRO OBS=100 SORT=4

1          OPTIONS NOSOURCE DQUOTE;
                                                                          00000010

NOTE: NUMERIC VALUES HAVE BEEN CONVERTED TO CHARACTER
      VALUES AT THE PLACES GIVEN BY: (LINE):(COLUMN).
      554:28  556:29  557:26

NOTE: INFILE COF IS:
      DSNAME=xxxaaaa.SAMPLE.SM.COF.ASUSA,
      UNIT=DISK,VOL=SER=USR107,DISP=SHR,
      DCB=(BLKSIZE=4240,LRECL=80,RECFM=FB)
NOTE: MISSING VALUES WERE GENERATED AS A RESULT OF PERFORMING
      AN OPERATION ON MISSING VALUES.
      EACH PLACE IS GIVEN BY: (NUMBER OF TIMES) AT (LINE):(COLUMN).
      1 AT 538:12
NOTE: 3 LINES WERE READ FROM INFILE COF.
NOTE: DATA SET WORK.ONE HAS 1 OBSERVATIONS AND 39 VARIABLES. 132 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.25 SECONDS AND 256K.


NOTE: INFILE PSPLIT IS:
      DSNAME=aaaa.SM.PSPLIT53.ASUSA.DATA,
      UNIT=DISK,VOL=SER=USR059,DISP=SHR,
      DCB=(BLKSIZE=9600,LRECL=96,RECFM=FB)
NOTE: 100 LINES WERE READ FROM INFILE PSPLIT.
NOTE: DATA SET WORK.PSPLIT HAS 50 OBSERVATIONS AND 30 VARIABLES. 198 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.11 SECONDS AND 180K.


NOTE: DATA SET WORK.PSPLIT HAS 50 OBSERVATIONS AND 30 VARIABLES. 198 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.28 SECONDS AND 636K.


NOTE: DATA SET WORK.SPECIES HAS 50 OBSERVATIONS AND 13 VARIABLES. 434 OBS/TRK.
```

```
NOTE: DATA SET WORK.CLASSES HAS 12 OBSERVATIONS AND 2 VARIABLES. 2346 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.05 SECONDS AND 168K.


NOTE: NUMERIC VALUES HAVE BEEN CONVERTED TO CHARACTER
      VALUES AT THE PLACES GIVEN BY: (LINE):(COLUMN).
      0:1  0:1  0:21

2        SAS(R) LOG   OS SAS 5.16          MVS/XA JOB xxxSM    STEP SM       PROC SAS  13:28 THURSDAY, JULY 16, 1987
NOTE: THE DATA STATEMENT USED 0.05 SECONDS AND 136K.


NOTE: INFILE TZF IS:
      DSNAME=xxxaaaa.TAM.TZFUSA.DATA,
      UNIT=DISK,VOL=SER=USR131,DISP=SHR,
      DCB=(BLKSIZE=6400,LRECL=80,RECFM=FB)
NOTE: 100 LINES WERE READ FROM INFILE TZF.
NOTE: DATA SET WORK.TIMEZONE HAS 100 OBSERVATIONS AND 4 VARIABLES. 1304 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.06 SECONDS AND 180K.


NOTE: DATA SET WORK.TIMEZONE HAS 100 OBSERVATIONS AND 4 VARIABLES. 1304 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.26 SECONDS AND 640K.


NOTE: DATA SET WORK.SORTOUT HAS 100 OBSERVATIONS AND 14 VARIABLES. 404 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.31 SECONDS AND 640K.


NOTE: DATA SET WORK.TZFOUT HAS 99 OBSERVATIONS AND 16 VARIABLES. 354 OBS/TRK.
NOTE: DATA SET ORPHAN.NOTIME HAS 1 OBSERVATIONS AND 16 VARIABLES. 354 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.11 SECONDS AND 232K.


NOTE: DATA SET WORK.TZFOUT HAS 99 OBSERVATIONS AND 16 VARIABLES. 354 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.27 SECONDS AND 636K.


NOTE: DATA SET SMOUT.DATA HAS 99 OBSERVATIONS AND 28 VARIABLES. 204 OBS/TRK.
NOTE: DATA SET ORPHAN.NOSPEC HAS 0 OBSERVATIONS AND 16 VARIABLES. 354 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.20 SECONDS AND 224K.


NOTE: 15 LINES WERE WRITTEN TO FILE PRINT.
NOTE: THE DATA STATEMENT USED 0.08 SECONDS AND 156K.


NOTE: INFILE SAROAD IS:
      DSNAME=xxxaaaa.FREDS53.SAROAD.DATA,
      UNIT=DISK,VOL=SER=USR127,DISP=SHR,
      DCB=(BLKSIZE=4240,LRECL=80,RECFM=FB)
NOTE: 27 LINES WERE READ FROM INFILE SAROAD.
NOTE: DATA SET WORK.SAROAD HAS 27 OBSERVATIONS AND 2 VARIABLES. 902 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.05 SECONDS AND 164K.


NOTE: DATA SET WORK.SAROAD HAS 27 OBSERVATIONS AND 2 VARIABLES. 902 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.26 SECONDS AND 632K.
```

```
NOTE: DATA SET WORK.CLASSES HAS 12 OBSERVATIONS AND 2 VARIABLES. 2346 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.27 SECONDS AND 632K.

3        SAS(R) LOG   OS SAS 5.16          MVS/XA JOB xxxSM    STEP SM       PROC SAS      13:28 THURSDAY, JULY 16, 1987

NOTE: DATA SET WORK.MATCH HAS 12 OBSERVATIONS AND 3 VARIABLES. 782 OBS/TRK.
NOTE: THE DATA STATEMENT USED 0.04 SECONDS AND 192K.


NOTE: DATA SET WORK.MATCH HAS 12 OBSERVATIONS AND 3 VARIABLES. 782 OBS/TRK.
NOTE: THE PROCEDURE SORT USED 0.27 SECONDS AND 632K.


NOTE: 16 LINES WERE WRITTEN TO FILE PRINT.
NOTE: THE DATA STATEMENT USED 0.04 SECONDS AND 128K.


NOTE: NUMERIC VALUES HAVE BEEN CONVERTED TO CHARACTER
      VALUES AT THE PLACES GIVEN BY: (LINE):(COLUMN).
      972:17

NOTE: THE DATA STATEMENT USED 0.05 SECONDS AND 132K.

NOTE: THE PROCEDURE PRINT USED 0.11 SECONDS AND 232K AND PRINTED PAGE 1.

NOTE: NO OBSERVATIONS IN DATA SET ORPHAN.NOSPEC .
NOTE: THE PROCEDURE PRINT USED 0.10 SECONDS AND 236K.

NOTE: THE PROCEDURE PRINT USED 0.16 SECONDS AND 252K AND PRINTED PAGES 2 TO 3.
NOTE: SAS USED 640K MEMORY.
NOTE: SAS INSTITUTE INC.
      SAS CIRCLE
      PO BOX 8000
      CARY, N.C. 27511-8000
 DATE: 16JUL87      TIME: 13:30:21
 FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)                                              SPECIATION MODULE (SM)
 DIAGNOSTIC REPORT                            1980 NAPAP 5.3 INVENTORY - U.S. AREA SOURCES          DETAILED LISTING
 -------------------------------------------------- CONTROL FILE LISTING -------------------------------------
 RUN IDENTIFICATION RECORD:
     SOURCE: AS  DETAIL: D  SAS FILE: DATA RUN ID: 1980 NAPAP 5.3 INVENTORY - U.S. AREA SOURCES

 SPECIATION FACTOR FILE DEFINITION RECORDS:
                                                        MAJOR     # OF
                                              RECORD #  POLLUTANT  SPECIES
                                              -----------------------------
                                                 1       ATHC        10
                                                 2       ANOX         2
                                              -----------------------------

                                                  SPECIE DESCRIPTIONS
                                      SF   POLLUTANT                 POLLUTANT
                                    NUMBER   SAROAD                 DESCRIPTION
                                    ------------------------------------------------------
                                       1    43298    OLEFINS
                                       2    43199    PARAFFINS
                                       3    45202    TOLUENE
                                       4    45102    XYLENE
                                       5    43502    FORMALDEHYDE
                                       6    43511    OTHER ALDEHYDES
                                       7    43203    ETHYLENE
```

```
                              8    43899    NON-REACTIVES
                              9    43243    ISOPRENE
                             10    43201    METHANE
                             11    42601    NO
                             12    42602    NO2
                                    SM ADDITIONS TO EMISSION RECORDS                    13:28 THURSDAY, JULY 16, 1987

EISSCC    STATE  COUNTY     SF1      SF2     SF3     SF4  SF5      SF6  SF7     SF8  SF9  SF10   SF11  SF12

00000001   08    0060      1107    19005    1515    4091   0     272.2   0     1560   0    0     0.00  0.00
00000001   08    0180     16601   285081   22725   61371   0    4082.3   0    23405   0    0     1.94  0.06
00000001   08    0240      5534    95027    7575   20457   0    1360.8   0     7802   0    0     0.97  0.03
00000001   09    0020         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0040      3320    57016    4545   12274   0     816.5   0     4681   0    0     0.00  0.00
00000001   21    0080         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0120      2214    38011    3030    8183   0     544.3   0     3121   0    0     0.00  0.00
00000001   21    0140      1107    19005    1515    4091   0     272.2   0     1560   0    0     0.00  0.00
00000001   21    0280         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0340         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0360         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0420         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0440         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0600         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0740      1107    19005    1515    4091   0     272.2   0     1560   0    0     0.00  0.00
00000001   21    0800      1107    19005    1515    4091   0     272.2   0     1560   0    0     0.00  0.00
00000001   21    0920         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    0960         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1000         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1160         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1300         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1320         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1400         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1500         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1600         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1680      2214    38011    3030    8183   0     544.3   0     3121   0    0     0.00  0.00
00000001   21    1740         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   21    1800         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
00000001   31    0080      9961   171049   13635   36822   0    2449.4   0    14043   0    0     1.94  0.06
00000001   31    0300     24349   418119   33330   90010   0    5987.4   0    34328   0    0     3.88  0.12
00000001   31    0660     29883   513146   40905  110467   0    7348.2   0    42129   0    0     4.85  0.15
00000001   31    0740     45377   779222   62115  167747   0   11158.3   0    63974   0    0     6.79  0.21
00000001   31    0780      2214    38011    3030    8183   0     544.3   0     3121   0    0     0.00  0.00
00000001   31    1050     13281   228065   18180   49097   0    3265.8   0    18724   0    0     1.94  0.06
00000001   31    1380    102929  1767504  140894  380499   0   25310.3   0   145113   0    0    15.52  0.48
00000001   31    1760     13281   228065   18180   49097   0    3265.8   0    18724   0    0     1.94  0.06
00000001   31    2240     48697   836239   66660  180021   0   11974.8   0    68655   0    0     6.79  0.21
00000001   31    2260      9961   171049   13635   36822   0    2449.4   0    14043   0    0     0.97  0.03
00000001   31    2980     28776   494141   39390  106376   0    7076.0   0    40569   0    0     3.88  0.12
00000001   31    3060     24349   418119   33330   90010   0    5987.4   0    34328   0    0     3.88  0.12
00000001   31    3180     14388   247070   19695   53188   0    3538.0   0    20285   0    0     1.94  0.06
00000001   31    3260     21028   361103   28785   77736   0    5170.9   0    29647   0    0     2.91  0.09
00000001   31    3900      1107    19005    1515    4091   0     272.2   0     1560   0    0     0.00  0.00
00000001   31    4120     46484   798228   63630  171838   0   11430.5   0    65535   0    0     6.79  0.21
00000001   31    4900      4427    76022    6060   16366   0    1088.6   0     6241   0    0     0.97  0.03
00000001   31    5020     11068   190054   15150   40914   0    2721.5   0    15603   0    0     1.94  0.06
00000001   31    5300     11068   190054   15150   40914   0    2721.5   0    15603   0    0     1.94  0.06
00000001   31    5440     57551   988282   78780  212752   0   14152.0   0    81138   0    0     8.73  0.27
00000001   31    5660     17708   304087   24240   65462   0    4354.5   0    24966   0    0     2.91  0.09
00000001   33    0060      2214    38011    3030    8183   0     544.3   0     3121   0    0     0.00  0.00
00000001   33    0120         0        0       0       0   0       0.0   0        0   0    0     0.00  0.00
```

```
00000001   33   0600    83007  1425407  113624  306854  0  20411.5  0  117026  0   0   11.64  0.36
00000001   33   0640     7747   133038   10605   28640  0   1905.1  0   10922  0   0    0.97  0.03
00000001   33   0840     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   0860     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.00  0.00
                                       SM ADDITIONS TO EMISSION RECORDS       13:28 THURSDAY, JULY 16, 1987

 EISSCC  STATE  COUNTY    SF1      SF2     SF3     SF4  SF5     SF6  SF7     SF8 SF9 SF10   SF11  SF12

00000001   33   1000     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.00  0.00
00000001   33   1060     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   1080     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.97  0.03
00000001   33   1120     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   1220     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   1400     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   1520     4427    76022    6060   16366  0   1088.6  0    6241  0   0    0.97  0.03
00000001   33   1620     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   2000     9961   171049   13635   36822  0   2449.4  0   14043  0   0    0.97  0.03
00000001   33   2020        0        0       0       0  0      0.0  0       0  0   0    0.00  0.00
00000001   33   2240     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   2340     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   2400     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   2660        0        0       0       0  0      0.0  0       0  0   0    0.00  0.00
00000001   33   2820        0        0       0       0  0      0.0  0       0  0   0    0.00  0.00
00000001   33   2960     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.00  0.00
00000001   33   3340     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.97  0.03
00000001   33   3440    29883   513146   40905  110467  0   7348.2  0   42129  0   0    3.88  0.12
00000001   33   3740     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   3880     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   4040     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.00  0.00
00000001   33   4380    12174   209060   16665   45005  0   2993.7  0   17164  0   0    1.94  0.06
00000001   33   4400     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   4520     4427    76022    6060   16366  0   1088.6  0    6241  0   0    0.97  0.03
00000001   33   4660   140558  2413688  192404  519605  0  34563.6  0  198164  0   0   20.37  0.63
00000001   33   4720     4427    76022    6060   16366  0   1088.6  0    6241  0   0    0.97  0.03
00000001   33   5060     8854   152043   12120   32731  0   2177.2  0   12483  0   0    0.97  0.03
00000001   33   5100     6641   114033    9090   24548  0   1632.9  0    9362  0   0    0.97  0.03
00000001   33   5120     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   5140     4427    76022    6060   16366  0   1088.6  0    6241  0   0    0.97  0.03
00000001   33   5180     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   5240     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   5260     3320    57016    4545   12274  0    816.5  0    4681  0   0    0.97  0.03
00000001   33   5640        0        0       0       0  0      0.0  0       0  0   0    0.00  0.00
00000001   33   5660    17708   304087   24240   65462  0   4354.5  0   24966  0   0    2.91  0.09
00000001   33   5700     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   5720     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   5780        0        0       0       0  0      0.0  0       0  0   0    0.00  0.00
00000001   33   5930     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   5965     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   6040     2214    38011    3030    8183  0    544.3  0    3121  0   0    0.00  0.00
00000001   33   6060     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   6080     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
00000001   33   6160     1107    19005    1515    4091  0    272.2  0    1560  0   0    0.00  0.00
```

SECTION 9

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APPENDIX A

MODEL DATA EXTRACTION MODULE SOURCE CODE

```
OPTIONS DQUOTE NOSOURCE;
*---------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: MODEL DATA EXTRACTION MODULE (MDEM) - POINT SOURCES

  LANGUAGE: SAS(VERSION 82.4)

  PURPOSE: TO EXTRACT DATA FROM THE EMISSIONS INVENTORY SYSTEM (EIS)
           MASTER FILE.  MDEM WILL:

                1. DROP UNNECESSARY EIS DATA.
                2. CREATE INDUSTRY-SPECIFIC EMISSION SUBFILES BASED
                   ON SIC-SCC COMBINATIONS AND, FOR POINT SOURCES,
                   MAJOR-MINOR EMISSION LIMITS.
                3. PROVIDE A REPORT ON PROCESSING ACTIVITIES.

  VARIABLE LIST:  CONTROL OPTIONS FILE

 NAME          ROUTINE                 DESCRIPTION
 ===============================================================
 DETAIL         MAIN        LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
 INDX1          MAIN        NUMBER OF TYPE 1 RECORDS (RUN IDENT.)
 INDX2          MAIN        NUMBER OF TYPE 2 RECORDS (SIC-SCC)
 INDX3          MAIN        NUMBER OF TYPE 3 RECORDS (MAJOR-MINOR)
 LIM_TH1-15     MAIN        EMISSION THRESHOLDS FOR MAJ-MIN SOURCES
 LIM_ID1-15     MAIN        SAROAD CODES FOR MAJOR-MINOR SOURCES
 RUN_ID         MAIN        RUN IDENTIFICATION HEADER
 SCC1-50        MAIN        SCC CODES FOR INDUSTRY SUBFILES
 SIC1-50        MAIN        SIC CODES FOR INDUSTRY SUBFILES
 SUBDD1-50      MAIN        JCL LABELS FOR SIC-SCC SUBFILES
 SOURCE         MAIN        EIS FILE TYPE
 TYPE           MAIN        CONTROL OPTION RECORD TYPE

  VARIABLE LIST:  EMISSIONS FILES

 NAME          ROUTINE                 DESCRIPTION
 ===============================================================
 AQCR           EISIN       AQCR
 COUNTY         EISIN       COUNTY CODE
 CONEFF1-15     EISIN       CONTROL EFFICIENCY
 CONPOL1-15     EISIN       SAROAD CODE OF CONTROLLED POLLUTANT
 DAYS           EISIN       DAYS PER WEEK OPERATIONAL
 EISSCC         EISIN       SCC CODE
 EISSIC         EISIN       SIC CODE
 EMISS1-15      EISIN       EMISSIONS FOR POLLUTANTS (TONS/YR)
 ESTMET1-15     EISIN       ESTIMATION METHOD
 FLOW           EISIN       EXHAUST GAS FLOWRATE (FT3/MIN)
 HOURS          EISIN       HOURS PER DAY OPERATIONAL
 LAT_DEG        EISIN       DEGREES LATITUDE
 LAT_MIN        EISIN       MINUTES LATITUDE
 LAT_SEC        EISIN       SECONDS LATITUDE
 LON_DEG        EISIN       DEGREES LONGITUDE
 LON_MIN        EISIN       MINUTES LONGITUDE
 LON_SEC        EISIN       SECONDS LONGITUDE
 MAJOR          EISIN       MAJOR POINT SOURCE FLAG
 NUMPOLL        EISIN       NUMBER OF POLLUTANTS ON EIS RECORD
 PLANT_ID       EISIN       PLANT IDENTIFICATION
 PLUME_HT       EISIN       PLUME HEIGHT (FT)
```

```
POINT_ID      EISIN       POINT IDENTIFICATION
PT_NUM        EISIN       NUMBER OF POINT POLLUTANTS
REC_DATE      EISIN       YEAR OF RECORD
SAROAD1-15    EISIN       POLLUTANT CODES (UP TO 15 POLLUTANTS)
SOURCE        EISIN       POINT SOURCE RECORD FLAG
STACK_DI      EISIN       STACK DIAMETER (FT)
STACK_HT      EISIN       STACK HEIGHT (FT)
STACK_TP      EISIN       STACK TEMPERATURE (F)
STATE         EISIN       STATE CODE
THRU_FAL      EISIN       FALL THRUPUT PERCENTAGE
THRU_SPR      EISIN       SPRING THRUPUT PERCENTAGE
THRU_SUM      EISIN       SUMMER THRUPUT PERCENTAGE
THRU_WIN      EISIN       WINTER THRUPUT PERCENTAGE
TYPE          EISIN       EIS RECORD TYPE
UTM_ZONE      EISIN       UTM ZONE OF PLANT
UTMX          EISIN       UTM HORIZONTAL COORDINATE
UTMY          EISIN       UTM VERTICAL COORDINATE
VELOCITY      EISIN       EXHAUST GAS VELOCITY
WEEKS         EISIN       WEEKS PER YEAR OPERATIONAL

  VARIABLE LIST:  GENERAL

NAME          ROUTINE               DESCRIPTION
=============================================================
AB              SETUP     COUNTER FOR SIC/SCC MACRO VARIABLES
B              EISIN      STRING VARIABLE FOR JCL DD LABEL ( N.A OR P)
BA              SETUP     COUNTER FOR LIMIT MACRO VARIABLES
DT              MAIN      DATE OF DIAGNOSTIC REPORT
FILEPRT         MAIN      NUMBER OF FILES TO PRINT IN DETAILED REPORT
I              EISIN      INDEX FOR SUBFILE CREATION
_I_             EISIN     INDEX FOR SEARCH AND REPORT ARRAYS
MACI           SETUP      SAROAD CODES FOR MAJOR-MINOR SOURCES
LIM_TH          SETUP      EMISSION THRESHOLDS FOR MAJ-MIN SOURCES
MAXFILE        EISIN      NUMBER OF INDUSTRY SUBFILES
ORDER          SORTEM     SORT ORDER OF SUBFILES
REC_CNT         EISIN     EIS INPUT RECORD COUNTER
REC0_CNT        EISIN     EIS SEGMENT 0 RECORD COUNTER
REC1_CNT        EISIN     EIS SEGMENT 1 RECORD COUNTER
REC2_CNT        EISIN     EIS SEGMENT 2 RECORD COUNTER
REC3_CNT        EISIN     EIS SEGMENT 3 RECORD COUNTER
RUNCOL            MAIN    COLUMN TO CENTER RUN_ID IN DIAGNOSTIC REPORT
IN                READ    SOURCE TYPE FROM COF
TM                MAIN    TIME OF DIAGNOSTIC REPORT
X            SORTEM,DETAIL  FILE COUNTER AND LOOP INDEX
Y                 MAIN    START INDEX OF COF VARIABLES IN REPORT
Z                 MAIN    END INDEX OF COF VARIABLES IN REPORT

  ERROR HANDLING:
     INPUT DATA FROM THE CONTROL OPTION FILE IS CHECKED FOR VALIDITY.
     THE DATA FROM THE EIS/MASTER FILE HAS ALREADY BEEN CHECKED BY THE
     EIS SYSTEM.  TWO LEVELS OF ERRORS ARE SUPPORTED:

                          1. FATAL: EXECUTION OF MDEM IS TERMINATED.
                          2. WARNING: USER IS NOTIFIED OF OCCURRENCE BUT
                             PROGRAM CONTINUES EXECUTION.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD: MDEM READS THE CONTROL FILE, CREATES SAS MACRO VARIABLES
          FROM THE CONTROL DATA AND CALLS THE PROPER EIS INPUT ROUTINE
          TO CREATE THE EMISSION SUBFILES AND PRODUCE A DIAGNOSTIC
          REPORT.

  PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, JUNE 1985

*----------------------------------------------------------------------*

****************************
* MACRO DEFINITION ROUTINE *
****************************

*-----DEFINE SAS MACROS TO BE CALLED BY MAIN ROUTINE.
;
***** MACRO EISIN

***** INPUT POINT SOURCE EIS FILE AND DIVIDE INTO INDUSTRY-SPECIFIC
      SUBFILES BASED ON SIC-SCC COMBINATIONS IN THE COF. ALSO DIVIDE
      INTO MAJOR-MINOR SOURCES BASED ON SPECIFIED EMISSION LIMITS IN
      THE CONTROL FILE.
;
%MACRO EISIN;
%*;
%*---- INITIALIZE MACRO VARIABLES AND BUILD COMMAND LINE FOR DATA STEP
       FURTHER DETAIL CAN BE FOUND IN THE MACRO AREA.
;
%LET MAXFILE=%EVAL(&INDX2);
%LET DROPS=%STR((DROP=REC_CNT REC0_CNT REC1_CNT REC2_CNT REC3_CNT));
DATA MAJTEMP.DATA&DROPS
%IF &MAXFILE>0 %THEN %DO I=1 %TO &MAXFILE;
  &&SUBDD&I...MAJOR&DROPS
%END;
%IF &MINOR=Y %THEN %DO;
  MINMISC.DATA&DROPS
  %IF &MAXFILE>0 %THEN %DO I=1 %TO &MAXFILE;
    &&SUBDD&I...MINOR&DROPS
  %END;
%END;
REPORT(KEEP=REC_CNT REC0_CNT REC1_CNT REC2_CNT REC3_CNT);
  INFILE EIS EOF=CNTOUT;
    RETAIN STATE COUNTY EISSCC PLANT_ID POINT_ID AQCR EISSIC
           LAT_DEG LAT_MIN LAT_SEC LON_DEG LON_MIN LON_SEC
           UTM_ZONE UTMX UTMY THRU_WIN THRU_SPR THRU_SUM
           THRU_FAL HOURS DAYS WEEKS REC_DATE PT_NUM CONPOL1-CONPOL15
           CONEFF1-CONEFF15 ESTMET1-ESTMET15 STACK_HT STACK_DI
           STACK_TP FLOW VELOCITY PLUME_HT SOURCE;
    ARRAY SAROAD SAROAD1-SAROAD15;
    ARRAY EMISS EMISS1-EMISS15;
    ARRAY CONPOL CONPOL1-CONPOL15;
    ARRAY CONEFF CONEFF1-CONEFF15;
    ARRAY ESTMET ESTMET1-ESTMET15;
    DROP TYPE;
*;
*----INPUT RECORD TYPE AND BRANCH TO PROPER INPUT FORMAT.
;
    INPUT @62 TYPE 1. @;
    REC_CNT+1;
*;
*---- EIS/PS SEGMENT 0 RECORD (PLANT).
;
    IF TYPE=0 THEN DO;
      REC0_CNT+1;
      INPUT @57 REC_DATE 2. @86 UTM_ZONE 2.;
      SOURCE='PS';
      RETURN;
    END;
*;
*---- EIS/PS SEGMENT 1 RECORD (POINT).
;
    IF TYPE=1 THEN DO;
      REC1_CNT+1;
      INPUT @44 STATE 2. @46 COUNTY 4. @50 AQCR 3. @53 PLANT_ID $ 4.
            @63 POINT_ID $ 2. @68 EISSIC 4. @74 UTMX 4.1 @78 UTMY 5.1
            @83 LAT_DEG 2. @85 LAT_MIN 2. @87 LAT_SEC 2. @89 LON_DEG 3.
            @92 LON_MIN 2. @94 LON_SEC 2. @96 THRU_WIN 2. @98 THRU_SPR
            2. @100 THRU_SUM 2. @102 THRU_FAL 2. @104 HOURS 2. @106 DAYS
            1. @107 WEEKS 2. @117 STACK_HT 4. @121 STACK_DI 3.1 @124
            STACK_TP 4. @128 FLOW 7. @135 VELOCITY 5. @140 PLUME_HT 4.
            @239 PT_NUM 2. @241 @;
            DO _I_=1 TO PT_NUM;
              INPUT CONPOL 5. +13 CONEFF 3.1 +29 ESTMET 1. +2 @;
            END;
            _I_=PT_NUM+1;
           DO WHILE(CONPOL NE .);
             IF CONPOL NE . THEN CONPOL=.;
             IF CONEFF NE . THEN CONEFF=.;
             IF ESTMET NE . THEN ESTMET=.;
             _I_=_I_+1;
           END;
*;
*     CHECK POINT SOURCE OPERATING DATA FOR VALIDITY
;
      IF DAYS=0 OR HOURS=0 OR WEEKS=0 THEN DO;
        DAYS=.;
        HOURS=.;
        WEEKS=.;
        PUT '*** WARNING: POINT SOURCE OPERATING DATA INVALID FOR'/
            '               STATE: ' STATE Z2. ' COUNTY: ' COUNTY Z4.
            ' PLANT: ' PLANT_ID $4.;
      END;
      RETURN;
    END;
*;
*---- EIS/PS SEGMENT 2 RECORD (SCC).
;
    IF TYPE=2 THEN DO;
      REC2_CNT+1;
      INPUT @65 EISSCC 8. @197 NUMPOLL 2. @;
*;
*     CHECK SCC CODE FOR 0, SKIP IF FOUND
;
      IF EISSCC=0 THEN DO;
        PUT '*** WARNING: SCC CODE OF 0 ENCOUNTERED FOR'/
            '               STATE: ' STATE Z2. ' COUNTY: ' COUNTY Z4.
            ' PLANT: ' PLANT_ID $4. ' POINT: ' POINT_ID $2.;
        RETURN;
      END;
      DO _I_=1 TO NUMPOLL;
        INPUT SAROAD 5. +12 EMISS 7. @;
      END;
    END;
*;
*---- EIS/PS SEGMENT 3 RECORD (COMMENT).
;
```

```
    IF TYPE=3 THEN DO;
      REC3_CNT+1;
      RETURN;
    END;
*;
*---- INVALID EIS/PS RECORD.
;
    IF TYPE<0 OR TYPE>3 THEN DO;
      PUT '*** WARNING: INVALID EIS-PS RECORD TYPE KEY '/
          '             ENCOUNTERED IN EIS-PS MASTER FILE AT: '
      REC_CNT 10.;
      RETURN;
    END;
*;
*---- LOOK FOR SIC-SCC MATCH.
;
      %IF &MAXFILE>0 %THEN %DO J=1 %TO &INDX2;
      IF EISSIC=&&SIC&J AND EISSCC=&&SCC&J THEN DO;
*;
*---- MATCH FOUND. CHECK FOR MAJOR POINT SOURCE.
;
      %IF &MINOR=Y %THEN %DO;
          %DO K=1 %TO &INDX3;
            DO _I_=1 TO NUMPOLL;
              IF &&LIM_ID&K=SAROAD THEN DO;
                IF EMISS>&&LIM_TH&K THEN DO;
                  MAJOR=1;
                  OUTPUT &&SUBDD&J...MAJOR /* MAJOR POINT SOURCE */;
                  RETURN;
                END;
              END;
            END;
          %END;
*;
*---- IF PROCESSING REACHES HERE, DETERMINE MINOR POINT SOURCE FILE
      NUMBER AND OUTPUT.
;
          MAJOR=0;
          OUTPUT &&SUBDD&J...MINOR /* MINOR POINT SOURCE */;
          RETURN;
      %END;
%*;
%*---- PROCESS FOLLOWING IF MINOR=N;
%*;
    %ELSE %DO;
      MAJOR=1;
      OUTPUT &&SUBDD&J...MAJOR /* MAJOR POINT SOURCE */;
      RETURN;
    %END;
    END;
  %END;
*;
*---- IF PROCESSING REACHES HERE, CHECK FOR MISC. MAJOR POINT SOURCE
;
  %IF &MINOR=Y %THEN %DO;
      %DO K=1 %TO &INDX3;
        DO _I_=1 TO NUMPOLL;
          IF &&LIM_ID&K=SAROAD THEN DO;
            IF EMISS>&&LIM_TH&K THEN DO;
              MAJOR=1;
              OUTPUT MAJTEMP.DATA /* MISC. MAJOR POINT SOURCE */;
            RETURN;
          END;
        END;
      END;
    %END;
*;
*---- IF PROCESSING REACHES HERE, WE HAVE A MISC. MINOR POINT SOURCE
;
      MAJOR=0;
      OUTPUT MINTEMP.DATA /* MISCELLANEOUS MINOR POINT SOURCE */;
      RETURN;
  %END;
  %ELSE %DO;
      MAJOR=1;
      OUTPUT MAJTEMP.DATA /* MISC MAJOR POINT SOURCE */;
      RETUPN;
  %END;
*
*---- OUTPUT RECORD COUNTS
;
      CNTOUT: OUTPUT REPORT:
*;
%MEND EISIN;
*;
***** MACRO DETAIL

***** PRINT OUT EMISSION SUBFILES. INVOKED BY SPECIFYING "D" IN
      THE RUN IDENTIFICATION RECORD OF THE CONTROL OPTIONS FILE.
      MACRO BUILDS FILENAMES USING PASSED ARGUMENTS THEN CALLS THE
      SAS PROC PRINT.
;
%MACRO DETAIL;
%*;
  %IF &DETAIL=D %THEN %DO;
%*;
%*---- POINT SOURCE RUN
;
      PROC PRINT DATA=MAJMISC.DATA;
      TITLE 'EMISSION SUBFILE-MISCELLANEOUS MAJOR POINT SOURCES';
      %IF &MINOR=Y %THEN %DO;
        PROC PRINT DATA=MINMISC.DATA;
        TITLE 'EMISSION SUBFILE-MISCELLANEOUS MINOR POINT SOURCES';
      %END;
      %IF &INDX2>0 %THEN %DO X=1 %TO &INDX2;
        PROC PRINT DATA=&&SUBDD&X...MAJOR;
        TITLE "EMISSION SUBFILE-&&SUBDD&X MAJOR POINT SOURCES";
        %IF MINOR=Y %THEN %DO;
          PROC PRINT DATA=&&SUBDD&X...MINOR;
          TITLE "EMISSION SUBFILE-&&SUBDD&X MINOR POINT SOURCES";
        %END;
      %END;
  %END;
%MEND DETAIL;
*
;
***** MACRO SORTEM

***** SORT EMISSION SUBFILES
;
%MACRO SORTEM;
%*;
```

```
%*---- SORT MISCELLANEOUS FILES
;
  %LET FILENUM=%EVAL(&INDX2);
    %LET ORDER=%STR(EISSCC STATE COUNTY PLANT_ID POINT_ID);
    PROC SORT DATA=MAJTEMP.DATA OUT=MAJMISC.DATA;
    BY &ORDER;
    %IF &MINOR=Y %THEN %DO;
      PROC SORT DATA=MINTEMP.DATA OUT=MINMISC.DATA;
      BY &ORDER;
    %END;
%*;
%*---- SORT SUBFILES IF PRESENT
;
  %IF &FILENUM>0 %THEN %DO X=1 %TO &FILENUM;
    PROC SORT DATA=&&SUBDD&X...&MAJOR;
    BY &ORDER;
    %IF &MINOR=Y %THEN %DO;
      PROC SORT DATA=&&SUBDD&X...MINOR;
      BY &ORDER;
    %END;
  %END;
%*;
%MEND SORTEM;
*
;
***** MACRO SETUP

***** CREATE MACRO VARIABLES FOR SUBFILE ALLOCATION
      AND CALL THE PROPER INPUT ROUTINE ACCORDING TO
      SOURCE TYPE.
;
%MACRO SETUP;
  %GLOBAL SUBDD1 SUBDD2 SUBDD3 SUBDD4 SUBDD5 SUBDD6 SUBDD7 SUBDD8
    SUBDD9 SUBDD10 SUBDD11 SUBDD12 SUBDD13 SUBDD14 SUBDD15 SUBDD16
    SUBDD17 SUBDD18 SUBDD19 SUBDD20 SUBDD21 SUBDD22 SUBDD23 SUBDD24
    SUBDD25 SUBDD26 SUBDD27 SUBDD28 SUBDD29 SUBDD30 SUBDD31 SUBDD32
    SUBDD33 SUBDD34 SUBDD35 SUBDD36 SUBDD37 SUBDD38 SUBDD39 SUBDD40
    SUBDD41 SUBDD42 SUBDD43 SUBDD44 SUBDD45 SUBDD46 SUBDD47 SUBDD48
    SUBDD49 SUBDD50;
  %IF &INDX2>0 %THEN %DO;
%*;
%*---- CREATE MACRO VARIABLES FROM CONTROL FILE VARIABLES.
;
   DATA _NULL_;SET ONE;
   %DO AB=1 %TO &INDX2;
     CALL SYMPUT("SIC&AB",SIC&AB);
     CALL SYMPUT("SCC&AB",SCC&AB);
     CALL SYMPUT("SUBDD&AB",SUBDD&AB);
   %END;
     %DO BA=1 %TO &INDX3;
       CALL SYMPUT("LIM_ID&BA",LIM_ID&BA);
       CALL SYMPUT("LIM_TH&BA",LIM_TH&BA);
     %END;
  RUN;
  %END;
%*;
%*---- CALL THE EIS INPUT MACRO.
;
  %EISIN
%*;
%*---- SORT EMISSION SUBFILES.
```

```
;
  %SORTEM
%*;
%MEND SETUP;
*
;
****************************
* END OF MACRO DEFINITIONS *
****************************
*
;
**********************
* MAIN PROGRAM: MDEM *
**********************

***** THIS PROGRAM WILL:
                1. READ THE CONTROL OPTIONS FILE.
                2. READ THE APPROPRIATE EIS MASTER FILE.
                3. DIVIDE THE DATA ACCORDING TO CONTROL PARAMETERS.
                4. SORT EMISSION SUBFILES.
                5. PRODUCE A DIAGNOSTIC REPORT.
;
***** READ THE CONTROL FILE AND CALL THE EIS INPUT MACRO.
;
*;
*---- OPEN FILES, INITIALIZE VARIABLES AND DEFINE ARRAYS.
;
DATA ONE(DROP=TYPE); INFILE COF EOF=WRITE;
  ARRAY SIC(INDX2) SIC1-SIC50;
  ARRAY SCC(INDX2) SCC1-SCC50;
  ARRAY SUBDD(INDX2) $ 8 SUBDD1-SUBDD50;
  ARRAY LIM_ID(INDX3) LIM_ID1-LIM_ID15;
  ARRAY LIM_TH(INDX3) LIM_TH1-LIM_TH15;
  RETAIN SOURCE DETAIL RUN_ID SIC1-SIC50 SCC1-SCC50 SUBDD1-SUBDD50
         LIM_ID1-LIM_ID15 LIM_TH1-LIM_TH15 MINOR;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION).
;
  IF TYPE=1 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 1 RECORDS.
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN CONTROL FILE';
      ABORT;
    END;
    INPUT @3 SOURCE $2. @6 DETAIL $1. @8 MINOR $1. @10  RUN_ID $62.;
*;
*     CHECK DATA FOR VALIDITY.
;
    IF SOURCE NE 'PS' THEN DO;
      PUT '*** FATAL: INVALID EIS FILE TYPE ' SOURCE=;
      ABORT;
    END;
    IF DETAIL NE 'D' AND DETAIL NE 'S' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT' DETAIL=;
      ABORT;
    END;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (SIC-SCC DEFINITION).
;
  IF TYPE=2 THEN DO;
*;
*     INCREMENT RECORD COUNTER AND ARRAY INDEX.
;
    INDX2+1;
*;
*     CHECK FOR TOO MANY SIC-SCC COMBINATIONS.
;
    IF(SOURCE='PS' AND INDX2>24)
      THEN DO;
      PUT '*** FATAL: TOO MANY SIC-SCC COMBINATIONS SPECIFIED ';
      ABORT;
    END;
*;
*     INPUT DATA.
;
    INPUT @3 SIC 4. @8 SCC 8. @17 SUBDD $8.;
    RETURN;
  END;
*;
*---- TYPE 3 CONTROL RECORD (MAJOR-MINOR DEFINITION).
;
  IF TYPE=3 THEN DO;
*;
*     INCREMENT COUNTER AND ARRAY INDEX.
;
    INDX3+1;
*;
*     CHECK FOR TOO MANY EMISSION LIMITS.
;
    IF INDX3>15 THEN DO;
      PUT '*** FATAL: TOO MANY MAJOR-MINOR EMISSION LIMITS ';
      ABORT;
    END;
*;
*     INPUT DATA.
;
    INPUT @3 LIM_ID 5. @9 LIM_TH 7. @17 SUBDD;
    RETURN;
  END;
*;
*---- INVALID CONTROL RECORD.
;
  PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
  ABORT;
*;
WRITE: IF INDX2=. THEN INDX2=0;
       IF INDX3=. THEN INDX3=0;
       OUTPUT;
*;
*
***** CALL PROPER ROUTINE TO CREATE SIC-SCC SUBFILES
;
CALL SYMPUT('INDX2',INDX2);
CALL SYMPUT('INDX3',INDX3);
CALL SYMPUT('MINOR',MINOR);
RUN;
```

```
%SETUP
*
***** WRITE DIAGNOSTIC REPORT
;
*---- DEFINE FILE, ASSIGN ARRAYS AND INITIALIZE VARIABLES
;
DATA _NULL_;MERGE ONE REPORT;
  ARRAY SIC SIC1-SIC50;
  ARRAY SCC SCC1-SCC50;
  ARRAY SUBDD SUBDD1-SUBDD50;
  ARRAY LIM_ID LIM_ID1-LIM_ID15;
  ARRAY LIM_TH LIM_TH1-LIM_TH15;
  FILE PRINT NOTITLES;
  IF DETAIL='S' THEN REPO=' SUMMARY';ELSE REPO='DETAILED';
  DT=DATE();TM=TIME();
  RUNCOL=66-LENGTH(RUN_ID)/2;
  Y=1;Z=8;
 *
 *---- PRINT HEADER
 ;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @97 'MODEL DATA EXTRACTION MODULE (MDEM)'//
      @2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
 *
 *---- PRINT TYPE 1 COF RECORD
 ;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SOURCE ' DETAIL: '
      DETAIL ' MINOR FLAG: ' MINOR ' RUN ID: ' RUN_ID//;
 *
 *---- PRINT TYPE 2 COF RECORDS
 ;
  IF INDX2>0 THEN DO;
    PUT @2 'SIC/SCC DEFINITION RECORDS. COUNT=' INDX2 2./;
    DO J=1 TO (INT(INDX2/8)+1);
      PUT @2 'SIC CODE :' @16 @;
      DO _I_=Y TO Z;
        PUT SIC 4. +3 ':' +3 @;
      END;
      PUT /@2 99*'-'/@2 'SCC CODE :' @14 @;
      DO _I_=Y TO Z;
        PUT SCC 8. +1 ':' +1 @;
      END;
      PUT /@2 99*'-'/@2 'DD LABEL :' @14 @;
      DO _I_=Y TO Z;
        PUT SUBDD $8. +1 ':' +1 @;
      END;
      Y=Y+8;Z=Z+8;
      PUT //;
    END;
  END;
 *
 *---- PRINT TYPE 3 COF RECORDS
 ;
  Y=1;Z=8;
  IF INDX3>0 THEN DO;
    PUT @2 'MAJOR/MINOR SOURCE DEFINITION RECORD. COUNT=' INDX3 2.//;
    DO J=1 TO (INT(INDX3/8)+1);
      PUT @2 'SAROAD CODE :' @17 @;
      DO _I_=Y TO Z;
        PUT LIM_ID 5. +2 ':' +2 @;
      END;
      PUT /@2 92*'-'/@2 'EMISSIONS :' @16 @;
      DO _I_=Y TO Z;
        PUT LIM_TH Z7. +1 ':' +1 @;
      END;
      Y=Y+8;Z=Z+8;
      PUT //;
    END;
  END;
*
;
  PUT /@2 55*'-' @58 'EIS FILE SUMMARY ' 57*'-'//
      @39 'TOTAL   SEGMENT 0   SEGMENT 1   SEGMENT 2   SEGMENT 3'/
      @38 55*'-'//@38 REC_CNT 6. +6 RECO_CNT 6. +6 REC1_CNT 6. +6
      REC2_CNT 6. +6 @;
      IF SOURCE='PS' THEN
        PUT REC3_CNT 6. _PAGE_;
      ELSE
        PUT _PAGE_;
*
*---- END OF SUMMARY REPORT. CALL MACRO FOR DETAILED REPORT.
;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('INDX2',INDX2);
CALL SYMPUT('MINOR',MINOR);
RUN;
%DETAIL
*
;
****************************
* END OF MDEM MAIN PROGRAM *
****************************
;
```

```
*OPTIONS DQUOTE NOSOURCE;
*----------------------------------------------------------------------*

 APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

 PROGRAM: MODEL DATA EXTRACTION MODULE (MDEM) - AREA SOURCES

 LANGUAGE: SAS(VERSION 5.08)

 PURPOSE: TO EXTRACT DATA FROM THE EMISSIONS INVENTORY SYSTEM (EIS)
          MASTER FILE.  MDEM WILL:

                  1. DROP UNNECESSARY EIS DATA.
                  2. CREATE INDUSTRY-SPECIFIC EMISSION SUBFILES BASED
                     ON SIC-SCC COMBINATIONS.
                  3. PROVIDE A REPORT ON PROCESSING ACTIVITIES.

  VARIABLE LIST:  CONTROL OPTIONS FILE

NAME          ROUTINE                  DESCRIPTION
=============================================================
ANN             MAIN       NUMBER OF ANNUAL POLLUTANTS TO EXTRACT
DETAIL          MAIN       LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
INDX1           MAIN       NUMBER OF TYPE 1 RECORDS (RUN IDENT.)
INDX2           MAIN       NUMBER OF TYPE 2 RECORDS (SIC-SCC)
LIM_TH1-15      MAIN       EMISSION THRESHOLDS FOR MAJ-MIN SOURCES
LIM_ID1-15      MAIN       SAROAD CODES FOR MAJOR-MINOR SOURCES
NAME1-15        MAIN       VARIABLE NAMES FOR ANNUAL POLLUTANTS
RUN_ID          MAIN       RUN IDENTIFICATION HEADER
SAROAD1-15      MAIN       SAROAD CODE FOR ANNUAL POLLUTANTS
SCC1-50         MAIN       SCC CODES FOR INDUSTRY SUBFILES
SIC1-50         MAIN       SIC CODES FOR INDUSTRY SUBFILES
SUBDD1-50       MAIN       JCL LABELS FOR SIC-SCC SUBFILES
SOURCE          MAIN       EIS FILE TYPE
TYPE            MAIN       CONTROL OPTION RECORD TYPE

  VARIABLE LIST:  EMISSIONS FILES

NAME          ROUTINE                  DESCRIPTION
=============================================================
AQCR            AREA       AQCR
COUNTY          AREA       COUNTY CODE
EISSCC          AREA       SCC CODE
SCURCE          AREA       SOURCE RECORD FLAG
STATE           AREA       STATE CODF

  VARIABLE LIST:  GENERAL

NAME          ROUTINE                  DESCRIPTION
=============================================================
AB              SETUP       COUNTER FOR SIC/SCC MACRO VARIABLES
B              AREA        STRING VARIABLE FOR JCL DD LABEL ( N.A OR P)
BA              SETUP       COUNTER FOR LIMIT MACRO VARIABLES
DT              MAIN        DATE OF DIAGNOSTIC REPORT
EMISS1-15       AREA       EMISSIONS FOR POLLUTANTS (TONS/YR)
FILEPRT         MAIN        NUMBER OF FILES TO PRINT IN DETAILED REPORT
I              AREA        INDEX FOR SUBFILE CREATION
J               AREA       LOOP COUNTER
MACI           SETUP        SAROAD CODES FOR MAJOR-MINOR SOURCES
MACSCC          SETUP       SCC CODES FOR INDUSTRY SUBFILES
```

```
MACSIC         SETUP       SIC CODES FOR INDUSTRY SUBFILES
MACTH         SETUP        EMISSION THRESHOLDS FOR MAJ-MIN SOURCES
MAXFILE       AREA        NUMBER OF INDUSTRY SUBFILES
NUMPOLL        AREA       NUMBER OF POLLUTANTS ON EIS RECORD
ORDER         SORTEM       SORT ORDER OF SUBFILES
REC_CNT        AREA       EIS INPUT RECCRD COUNTER
REC0_CNT       AREA       EIS SEGMENT 0 RECORD COUNTER
REC1_CNT       AREA       EIS SEGMENT 1 RECORD COUNTER
REC2_CNT       AREA       EIS SEGMENT 2 RECORD COUNTER
RUNCOL          MAIN       COLUMN TO CENTER RUN_ID IN DIAGNOSTIC REPORT
SAROAD1-15     AREA       POLLUTANT CODES (UP TO 15 POLLUTANTS)
TYPE           AREA       EIS RECORD TYPE
IN              READ       SOURCE TYPE FROM COF
IN1             READ1      SOURCE TYPE FROM COF
IN3            DETAIL      SOURCE TYPE FROM COF
Q              AREA       MACRO COUNTER
TM              MAIN       TIME OF DIAGNCSTIC REPORT
X          SORTEM,DETAIL  FILE COUNTER AND LOOP INDEX
Y               MAIN       START INDEX OF COF VARIABLES IN REPORT
Z               MAIN       END INDEX OF COF VARIABLES IN REPORT

  ERROR HANDLING:
     INPUT DATA FROM THE CONTROL OPTION FILE IS CHECKED FOR VALIDITY.
     THE DATA FROM THE EIS/MASTER FILE HAS ALREADY BEEN CHECKED BY THE
     EIS SYSTEM.  TWO LEVELS OF ERRORS ARE SUPPORTED:

                          1. FATAL: EXECUTION OF MDEM IS TERMINATED.
                          2. WARNING: USER IS NOTIFIED OF OCCURRENCE BUT
                             PROGRAM CONTINUES EXECUTION.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD: MDEM READS THE CONTROL FILE, CREATES SAS MACRO VARIABLES
          FROM THE CONTROL DATA AND CALLS THE PROPER EIS INPUT ROUTINE
          TO CREATE THE EMISSION SUBFILES AND PRODUCE A DIAGNOSTIC
          REPORT.  EMISSION RATES ARE ORGANIZED INTO VARIABLES DEFINED
          IN THE CONTROL FILE.

  PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, JUNE 1985

     UPDATED: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, JUNE 1986


*----------------------------------------------------------------------*

****************************
* MACRO DEFINITION ROUTINE *
****************************

*-----DEFINE SAS MACROS TO BE CALLED BY MAIN ROUTINE.
;
***** MACRO EISIN

***** INPUT AREA SOURCE EIS FILE AND DIVIDE INTO SIC-SCC SPECIFIC
      SUBFILES USING CONTROL FILE DATA.
;
%MACRO EISIN;
%*;
%*---- INITIALIZE MACRO VARS AND BUILD COMMAND LINE FOR DATA STATEMENT
       THE COMMAND LINE IS FORMED BY CONCATENATING THE MISC. FILE
       NAME TO ANY SUBFILES SPECIFIED IN THE COF PLUS THE
       REPORT FILE.  EXTRACT ANNUAL POLLUTANTS.
;
%LET MAXFILE=%EVAL(&INDX2);
%LET DROPS=%STR((DROP=REC_CNT REC0_CNT REC1_CNT REC2_CNT REC3_CNT));
DATA TEMP.DATA&DROPS
%IF &MAXFILE>0 %THEN %DO I=1 %TO &MAXFILE;
  &&SUBD&I...AREA&DROPS
%END;
REPORT(KEEP=REC_CNT REC0_CNT REC1_CNT REC2_CNT);
  INFILE EISMF EOF=CNTOUT;
    ARRAY SAROAD SAROAD1-SAROAD15;
    ARRAY EMISS EMISS1-EMISS15;
    DROP TYPE NUMPOLL SAROAD1-SAROAD15 EMISS1-EMISS15;
*;
*----INPUT RECORD TYPE AND BRANCH TO PROPER INPUT FORMAT.
;
    INPUT @21 TYPE 1. @;
    REC_CNT+1;
*;
*---- EIS/AS SEGMENT 0 RECORD (DESCRIPTION).
;
    IF TYPE=0 THEN DO;
      REC0_CNT+1;
      RETURN;
    END;
*;
*---- EIS/AS SEGMENT 1 RECORD (CATEGORY).
;
    IF TYPE=1 THEN DO;
      REC1_CNT+1;
      SOURCE='AS';
      INPUT @1 STATE 2. @3 COUNTY 4. @16 EISSCC 3.
            @278 NUMPOLL 2. @;
            DO _I_=1 TO NUMPOLL;
              INPUT SAROAD 5. +46 EMISS 7. +7 @;
            END;
*;
*     EXTRACT EIS POLLUTANTS;
*;
            DO _I_=1 TO NUMPOLL;
              SELECT (SAROAD);
              %DO Q=1 %TO &ANN;
                WHEN (&&SAROAD&Q) &&NAME&Q=EMISS;
              %END;
                OTHERWISE;
              END;
            END;
*;
    END:
*;
*---- EIS/AS SEGMENT 2 RECORD (COMMENT).
;
    IF TYPE=2 THEN DO;
      REC2_CNT+1;
      RETURN;
    END;
*;
*---- INVALID EIS/AS RECORD.
;
    IF TYPE<0 OR TYPE>2 THEN DO;
      PUT '*** WARNING: INVALID EIS-AS RECORD TYPE KEY '/
```

```
        '                ENCOUNTERED IN E1S-AS MASTER FILE AT: '
      REC_CNT 10.;
      RETURN;
    END;
*;
*---- LOOK FOR SIC-SCC MATCH. OUTPUT TO PROPER FILE (FILENUM).
;
      %IF &MAXFILE>0 %THEN %DO J=1 %TO &INDX2;
        IF EISSCC=&&MACSCC&J THEN DO;
          OUTPUT &&SUBDD&J...AREA /* AREA SOURCE SUBFILE */;
          RETURN;
        END;
      %END;
*;
*---- IF PROCESSING REACHES HERE THEN NO MATCH WAS FOUND.
      OUTPUT TO MISCELLANEOUS FILE.
;
      OUTPUT TEMP.DATA /* AREA SOURCE MISCELLANEOUS FILE */;
      RETURN;
*
*----OUTPUT RECORD COUNTS
;
    CNTOUT: OUTPUT REPORT;
*;
%MEND EISIN;
*
;
***** MACRO DETAIL

***** PRINT OUT EMISSION SUBFILES. INVOKED BY SPECIFYING "D" IN
      THE RUN IDENTIFICATION RECORD OF THE CONTROL OPTIONS FILE.
      MACRO BUILDS FILENAMES USING PASSED ARGUMENTS THEN CALLS THE
      SAS PROC PRINT.
;
%MACRO DETAIL;
%*;
  %IF &DETAIL=D %THEN %DO;
%*;
      PROC PRINT DATA=MAJOR.DATA;
      TITLE 'EMISSION SUBFILE-AREA SOURCES';
      ID EISSCC STATE COUNTY;
      FORMAT STATE Z2. COUNTY Z4.;
      %IF &INDX2>0 %THEN %DO X=1 %TO &INDX2;
        PROC PRINT DATA=&&SUBDD&X...AREA;
        TITLE "EMISSION SUBFILE-&&SUBDD&X AREA SOURCES";
        ID EISSCC STATE COUNTY;
        FORMAT STATE Z2. COUNTY Z4.;
    %END;
  %END;
%MEND DETAIL;
*
;
***** MACRO SORTEM

***** SORT EMISSION SUBFILES
;
%MACRO SORTEM;
%*;
%*---- SORT MISCELLANEOUS FILES
;
  %LET FILENUM=%EVAL(&INDX2);
```

```
    %LET ORDER=%STR(EISSCC STATE COUNTY);
    PROC SORT DATA=TEMP.DATA OUT=MAJOR.DATA;
    BY &ORDER;
%*---- SORT SUBFILES IF PRESENT
;
  %IF &FILENUM>0 %THEN %DO X=1 %TO &FILENUM;
    PROC SORT DATA=&&SUBDD&X...AREA;
    BY &ORDER;
    %IF &MINOR=Y %THEN %DO;
      PROC SORT DATA=&&SUBDD&X...MINOR;
      BY &ORDER;
    %END;
  %END;
%*;
%MEND SORTEM;
*
;
***** MACRO SETUP

***** CREATE MACRO VARIABLES FOR SUBFILE ALLOCATION
      AND CALL THE PROPER INPUT ROUTINE ACCORDING TO
      SOURCE TYPE.
;
%MACRO SETUP;
  %GLOBAL SUBDD1 SUBDD2 SUBDD3 SUBDD4 SUBDD5 SUBDD6 SUBDD7 SUBDD8
    SUBDD9 SUBDD10 SUBDD11 SUBDD12 SUBDD13 SUBDD14 SUBDD15 SUBDD16
    SUBDD17 SUBDD18 SUBDD19 SUBDD20 SUBDD21 SUBDD22 SUBDD23 SUBDD24
    SUBDD25 SUBDD26 SUBDD27 SUBDD28 SUBDD29 SUBDD30 SUBDD31 SUBDD32
    SUBDD33 SUBDD34 SUBDD35 SUBDD36 SUBDD37 SUBDD38 SUBDD39 SUBDD40
    SUBDD41 SUBDD42 SUBDD43 SUBDD44 SUBDD45 SUBDD46 SUBDD47 SUBDD48
    SUBDD49 SUBDD50;
%*;
%*---- CREATE MACRO VARIABLES FROM CONTROL FILE VARIABLES.
;
    DATA _NULL_;SET ONE;
  %IF &INDX2>0 %THEN %DO;
    %DO AB=1 %TO &INDX2;
      CALL SYMPUT("MACSIC&AB",SIC&AB);
      CALL SYMPUT("MACSCC&AB",SCC&AB);
      CALL SYMPUT("SUBDD&AB",SUBDD&AB);
    %END;
  %END;
%*;
%*---- CREATE ANNUAL POLLUTANT VARIABLE NAMES;
%*;
    %DO BA=1 %TO &ANN;
      CALL SYMPUT("SAROAD&BA",SAROAD&BA);
      CALL SYMPUT("NAME&BA",NAME&BA);
    %END;
  RUN;
%*;
%*---- CALL THE EIS INPUT MACRO.
;
  %EISIN
%*---- SORT EMISSION SUBFILES.
;
  %SORTEM
%*;
%MEND SETUP;
*
;
```

```
****************************
* END OF MACRO DEFINITIONS *
****************************
*
;
**********************
* MAIN PROGRAM: MDEM *
**********************

***** THIS PROGRAM WILL:
                1. READ THE CONTROL OPTIONS FILE.
                2. READ THE APPROPRIATE EIS MASTER FILE.
                3. DIVIDE THE DATA ACCORDING TO CONTROL PARAMETERS.
                4. ASSIGN EMISSIONS TO USER-DEFINED VARIABLES.
                5. SORT EMISSION SUBFILES.
                6. PRODUCE A DIAGNOSTIC REPORT.
;
***** READ THE CONTROL FILE AND CALL THE EIS INPUT MACRO.
;
*;
*---- OPEN FILES, INITIALIZE VARIABLES AND DEFINE ARRAYS.
;
DATA ONE(DROP=TYPE); INFILE COF EOF=WRITE;
  ARRAY SAROAD SAROAD1-SAROAD15;
  ARRAY NAME $ 8 NAME1-NAME15,
  ARRAY SIC(INDX2) SIC1-SIC50;
  ARRAY SCC(INDX2) SCC1-SCC50;
  ARRAY SUBDD(INDX2) $ 8 SUBDD1-SUBDD50;
  RETAIN SOURCE DETAIL RUN_ID SIC1-SIC50 SCC1-SCC50 SUBDD1-SUBDD50
         MINOR SAROAD1-SAROAD15 NAME1-NAME15 ANN;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION).
;
  IF TYPE=1 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 1 RECORDS.
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN CONTROL FILE';
      ABORT;
    END;
    INPUT @3 SOURCE $2. @6 DETAIL $1. @8 MINOR $1. @10  RUN_ID $62.;
*;
*     CHECK DATA FOR VALIDITY.
;
    IF SOURCE NE 'AS' THEN DO;
      PUT '*** FATAL: INVALID EIS FILE TYPE ' SOURCE=;
      ABORT;
    END;
    IF DETAIL NE 'D' AND DETAIL NE 'S' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT' DETAIL=;
      ABORT;
    END;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (SIC-SCC DEFINITION).
;
  IF TYPE=2 THEN DO;
```

```
*;
*     INCREMENT RECORD COUNTER AND ARRAY INDEX.
;
    INDX2+1;
*;
*     CHECK FOR TOO MANY SIC-SCC COMBINATIONS.
;
    IF SOURCE='AS' AND INDX2>49
      THEN DO;
      PUT '*** FATAL: TOO MANY SIC-SCC COMBINATIONS SPECIFIED ';
      ABORT;
    END;
*;
*     INPUT DATA.
;
    INPUT @3 SIC 4. @8 SCC 8. @17 SUBDD $8.;
    RETURN;
  END;
*;
*---- TYPE 3 CONTROL RECORD (ANNUAL POLLUTANTS);
*;
  IF TYPE=3 THEN DO;
*;
*     INPUT NUMBER OF ANNUAL POLLUTANTS;
*;
    INPUT @3 ANN 2.;
*;
*    MAKE SURE CORRECT NUMBER OF POLLUTANTS;
*;
    IF ANN LT 1 OR ANN GT 15 THEN DO;
      PUT '*** FATAL: INCORRECT NUMBER OF ANNUAL POLLUTANTS';
      ABORT;
    END;
*;
*---- INPUT ANNUAL POLLUTANT IDENTIFICATION RECORDS;
*;
    DO _I_=1 TO ANN;
      INPUT @1 TYPE 1. @;
*;
*     CHECK RECORD;
*;
       IF TYPE NE . THEN DO;
         PUT '***FATAL: INVALID ANNUAL POLLUTANT IDENTIFICATION RECORD';
         ABORT;
       END;
*;
*      INPUT RECORD;
*;
       INPUT @2 SAROAD 5. @8 NAME $8.;
      END;
      RETURN;
    END;
*;
*---- INVALID CONTROL RECORD.
;
  PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
  ABORT;
*;
WRITE: IF INDX2=. THEN INDX2=0;
       OUTPUT;
*;
```

```
*
***** CALL PROPER ROUTINE TO CREATE SIC-SCC SUBFILES
;
CALL SYMPUT('INDX2',INDX2);
CALL SYMPUT('MINOR',MINOR);
CALL SYMPUT('ANN',ANN);
RUN;
%SETUP
*
***** WRITE DIAGNOSTIC REPORT
;
*---- DEFINE FILE, ASSIGN ARRAYS AND INITIALIZE VARIABLES
;
DATA _NULL_;MERGE ONE REPORT;
  ARRAY SIC SIC1-SIC50;
  ARRAY SCC SCC1-SCC50;
  ARRAY NAME $ 8 NAME1-NAME15;
  ARRAY SAROAD SAROAD1-SAROAD15;
  ARRAY SUBDD SUBDD1-SUBDD50;
  ARRAY LIM_ID LIM_ID1-LIM_ID15;
  ARRAY LIM_TH LIM_TH1-LIM_TH15;
  FILE PRINT NOTITLES;
  IF DETAIL='S' THEN REPO=' SUMMARY';ELSE REPO='DETAILED';
  DT=DATE();TM=TIME();
  RUNCOL=66-LENGTH(RUN_ID)/2;
  Y=1;Z=8;
*
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @97 'MODEL DATA EXTRACTION MODULE (MDEM)'//
      @2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*
*---- PRINT TYPE 1 COF RECORD
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SOURCE ' DETAIL: '
      DETAIL ' MINOR FLAG: ' MINOR ' RUN ID: ' RUN_ID//;
*
*---- PRINT TYPE 2 COF RECORDS
;
  IF INDX2>0 THEN DO;
    PUT @2 'SIC/SCC DEFINITION RECORDS. COUNT=' INDX2 2./;
    DO J=1 TO (INT(INDX2/8)+1);
      PUT @2 'SIC CODE :' @16 @;
      DO _I_=Y TO Z;
        PUT SIC 4. +3 ':' +3 @;
      END;
      PUT /@2 99*'-'/@2 'SCC CODE :' @14 @;
      DO _I_=Y TO Z;
        PUT SCC 8. +1 ':' +1 @;
      END;
      PUT /@2 99*'-'/@2 'DD LABEL :' @14 @;
      DO _I_=Y TO Z;
        PUT SUBDD $8. +1 ':' +1 @;
      END;
      Y=Y+8;Z=Z+8;
      PUT //;
    END;
  END;
*---- PRINT TYPE 3 COF RECORDS;
*;
  PUT @2 'POLLUTANT IDENTIFICATION RECORDS: ' ANN 2.//;
  PUT @57 'SAROAD    POLLUTANT';
  PUT @56 '----------------------';
  DO _I_=1 TO ANN;
    PUT @57 SAROAD 5. @68 NAME $8.:
  END;
  PUT //;
*;
*---- PRINT EIS MASTER FILE SUMMARY;
*;
  PUT /@2 55*'-' @58 'EIS FILE SUMMARY ' 57*'-'//
      @39 'TOTAL   SEGMENT 0   SEGMENT 1   SEGMENT 2   SEGMENT 3'/
      @38 55*'-'//@38 REC_CNT 6. +6 REC0_CNT 6. +6 REC1_CNT 6. +6
      REC2_CNT 6. +6 @;
      PUT _PAGE_;
*
*---- END OF SUMMARY REPORT. CALL MACRO FOR DETAILED REPORT.
;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('INDX2',INDX2);
CALL SYMPUT('MINOR',MINOR);
RUN;
%DETAIL
*
;
****************************
* END OF MDEM MAIN PROGRAM *
****************************
;
```

APPENDIX B

TEMPORAL ALLOCATION MODULE SOURCE CODE

```
OPTIONS NOSOURCE DQUOTE;
*-------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: TEMPORAL ALLOCATION MODULE (TAM) - POINT SOURCES

  LANGUAGE: SAS (VERSION 5.08)

  PURPOSE: TO APPLY TEMPORAL ALLOCATION FACTORS AND TIMEZONE DATA
           TO EMISSION RECORDS OUTPUT FROM MDEM.

  VARIABLE LIST: CONTROL OPTIONS FILE

NAME        ROUTINE                  DESCRIPTION
====================================================================
TYPE          MAIN      CONTROL OPTIONS RECORD TYPE
SCE           MAIN      SOURCE TYPE OF EMISSION FILE
DETAIL        MAIN      LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
SASMEM        MAIN      SAS MEMBER NAME OF INPUT EMISSION FILE
TAFDAY        MAIN      NUMBER OF TAFDAY IN TEMPORAL ALLOCATION FILE
RUN_ID        MAIN      RUN IDENTIFICATION HEADER

  VARIABLE LIST: TIMEZONE FILE

NAME        ROUTINE                  DESCRIPTION
====================================================================
STATE       EXECUTE     STATE CODE
COUNTY      EXECUTE     COUNTY CODE
ZONE        EXECUTE     TIME ZONE CODE
DAYLITE     EXECUTE     DAYLIGHT SAVINGS FLAG

  VARIABLE LIST: TEMPORAL ALLOCATION FACTOR FILE

NAME        ROUTINE                  DESCRIPTION
====================================================================
TAFCODE         PSTAF    SEASON-DAY CODE
STATE           PSTAF    STATE CODE
COUNTY          PSTAF    COUNTY CODE
EISSCC          PSTAF    SCC CODE
SEA(NUM_DAY)    PSTAF    SEASONAL FRACTION (1 FOR EACH TAFCODE)
DAY(NUM_DAY)    PSTAF    DAILY FRACTION (1 FOR EACH TAFCODE)
HOUR(NUMHRS)    PSTAF    HOURLY FRACTIONS (24 FOR EACH TAFCODE)

  VARIABLE LIST: ADDITIONS TO EMISSION FILE

NAME        ROUTINE                  DESCRIPTION
====================================================================
ZONE        EXECUTE       GREENWICH MEAN TIME OFFSET
DAYLITE     EXECUTE       DAYLIGHT SAVINGS FLAG
NUM_DAY         PSTAF    NUMBER OF SETS OF TEMPORAL FACTORS
SEA(NUM_DAY)    PSTAF    SEASONAL PERCENTAGE
DAY(NUM_DAY)    PSTAF    DAILY PERCENTAGE
HOUR(NUMHRS)    PSTAF    HOURLY FRACTIONS

  VARIABLE LIST: GENERAL

NAME        ROUTINE                  DESCRIPTION
====================================================================
START           PSTAF    STARTING POINT OF HOUR ARRAY FOR DAY NUM DAY
```

```
FINISH        PSTAF     ENDING POINT OF HOUR ARRAY FOR DAY NUM_DAY
_I_           PSTAF     INDEX FOR ARRAYS
X             PSTAF      INDEX FOR NUM_DAY
INDX1         MAIN       TYPE 1 CONTROL RECORD COUNTER
VARS        EXECUTE      MACRO VARIABLE FOR SUBSET CREATION AND SORT
INA         EXECUTE      MERGE INDICATOR
IN1           PSTAF     MERGE INDICATOR
IN2           PSTAF     MERGE INDICATOR
NUMHRS        PSTAF     MACRO VARIABLE FOR SIZE OF ARRAY HOUR
TM            MAIN       SYSTEM TIME
DT            MAIN       SYSTEM DATE
MISS          PSTAF     MACRO VARIABLE FOR TAF DROP LIST
THRU_TOT        PSTAF     SEASONAL THROUGHPUT SUM
MAKEUP          PSTAF     (100-THRU_TOT)/4

  ERROR HANDLING:
     ERRORS IN THE CONTROL FILE WILL HALT EXECUTION. TEMPORAL ALLOCATION
     FACTORS MUST HAVE FOR EACH SCC, STATE, COUNTY COMBINATION ONE
     RECORD FOR EACH DAY IN FILE.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD: TAM INPUTS AND CHECKS THE CONTROL OPTIONS FILE. THE TIMEZONE
          FILE IS READ, SORTED AND MERGED TO A SUBSET OF THE EMISSIONS
          FILE. RECORDS WITH NO TIMEZONE DATA ARE PLACED IN A SEPERATE
          FILE. THE TEMPORAL ALLOCATION FACTORS ARE READ, DIVIDED BY
          LEVEL OF SPECIFICITY, AND MERGED WITH THE EMISSION FILE.
          FOR EMISSION RECORDS WITH MISSING TEMPORAL DATA, PATTERNS ARE
          GENERATED USING OPERATING RATE DATA. THE DIAGNOSTIC REPORT IS
          PRINTED.

PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, SEPTEMBER 1985

*--------------------------------------------------------------------*

;
********************
* MACRO DEFINITIONS *
********************
;
***** MACRO PSTAF

***** MERGE POINT SOURCE EMISSIONS (FILE TEMP.EMISS) WITH TEMPORAL
      ALLOCATION FACTORS. TAF ARE READ, DIVIDED INTO SPECIFIC LEVELS,
      (SCC, STATE, COUNTY, PLANT ID, POINT ID) AND MERGED. NON-MATCHES
      HAVE PATTERNS GENERATED BASED ON OPERATING DATA, IF PRESENT, OR
      ARE ASSIGNED A UNIFORM DISTRIBUTION.
;
%MACRO PSTAF;
*;
***** INPUT TEMPORAL ALLOCATION FACTORS AND DIVIDE. TAFF IS ASSUMED
      TO BE SORTED BY SCC, STATE, COUNTY, TAFCODE, AS WELL AS QA-ED.
;
%LET TAFDAY=%EVAL(&TAFDAY);
%LET NUMHRS=%EVAL(&TAFDAY*24);
%LET MISS=%STR((DROP=NUM_DAY SEA1-SEA&TAFDAY DAY1-DAY&TAFDAY HOUR1-
     HOUR&NUMHRS));
DATA SCCTAF(DROP=STATE COUNTY) STTAF(DROP=COUNTY) CTYTAF;
  INFILE TAFF;
  ARRAY SEA(NUM_DAY) SEA1-SEA&TAFDAY;
  ARRAY DAY(NUM_DAY) DAY1-DAY&TAFDAY;
  ARRAY HOUR HOUR1-HOUR&NUMHRS;
  DROP START FINISH;
  RETAIN;
  INPUT @1 NUM_DAY 2. STATE 2. COUNTY 4. EISSCC 8. SEA 3.3 DAY 4.4 @;
  START=(NUM_DAY-1)*24+1;
  FINISH=START+23;
  DO _I_=START TO FINISH;
    INPUT HOUR 3.3 @;
  END;
  IF NUM_DAY=&TAFDAY THEN DO;
    IF COUNTY NE . THEN OUTPUT CTYTAF;
    ELSE IF STATE NE . THEN OUTPUT STTAF;
    ELSE IF EISSCC NE . THEN OUTPUT SCCTAF;
  END;
*;
***** MERGE TAF FILES WITH TEMP.EMISS
;
*---- COUNTY SPECIFIC
;
DATA TEMP1.CTY TEMP2.NOCTY&MISS;
  MERGE CTYTAF(IN=IN2) TEMP.EMISS(IN=IN1);
  BY EISSCC STATE COUNTY;
  IF IN1 AND IN2 THEN OUTPUT TEMP1.CTY;
  ELSE IF IN1 THEN OUTPUT TEMP2.NOCTY;
*;
*---- STATE SPECIFIC
;
DATA TEMP3.ST TEMP1.NOST&MISS;
  MERGE STTAF(IN=IN2) TEMP2.NOCTY(IN=IN1);
  BY EISSCC STATE;
  IF IN1 AND IN2 THEN OUTPUT TEMP3.ST;
  ELSE IF IN1 THEN OUTPUT TEMP1.NOST;
*;
*---- SCC SPECIFIC
;
DATA TEMP4.SCC TEMP5.NOSCC TEMP2.NOOP;
  MERGE SCCTAF(IN=IN2) TEMP1.NOST(IN=IN1);
  BY EISSCC;
  ARRAY SEA SEA1-SEA&TAFDAY;
  ARRAY DAY DAY1-DAY&TAFDAY;
  ARRAY HOUR HOUR1-HOUR&NUMHRS;
  DROP X START FINISH THRU_TOT MAKEUP;
  IF IN1 AND IN2 THEN OUTPUT TEMP4.SCC;
*;
*---- GENERATE PATTERNS BASED ON OPERATING RATE DATA, IF PRESENT.
;
  ELSE IF IN1 AND THRU_WIN NE . AND THRU_SPR NE . AND THRU_SUM NE .
       AND THRU_FAL NE . AND WEEKS NE . AND DAYS NE . AND HOURS NE .
       THEN DO;
     NUM_DAY=&TAFDAY;
*;
*     CHECK SEASONAL THROUGHPUT TOTAL, NORMALIZE IF NECESSARY
;
    THRU_TOT=THRU_WIN+THRU_SPR+THRU_SUM+THRU_FAL;
    IF THRU_TOT<95 OR THRU_TOT>105 THEN DO;
      MAKEUP=(100-THRU_TOT)/4;
      THRU_WIN=THRU_WIN+MAKEUP;
      IF THRU_WIN<0 THEN THRU_WIN=0;
      THRU_SPR=THRU_SPR+MAKEUP;
      IF THRU_SPR<0 THEN THRU_SPR=0;
      THRU_SUM=THRU_SUM+MAKEUP;
      IF THRU_SUM<0 THEN THRU_SUM=0;
      THRU_FAL=THRU_FAL+MAKEUP;
      IF THRU_FAL<0 THEN THRU_FAL=0;
      PUT '*** WARNING: SEASONAL THROUGHPUTS NORMALIZED FOR'/
          '               SCC: ' EISSCC Z8. ' STATE: ' STATE Z2.
          ' COUNTY: ' COUNTY Z4. ' PLANT: ' PLANT_ID $4.
          ' POINT: ' POINT_ID $2. ' ' MAKEUP=;
    END;
*;
*     SEASONAL FRACTIONS
;
    SEA1=THRU_WIN/100;SEA2=THRU_WIN/100;SEA3=THRU_WIN/100;
    SEA4=THRU_SPR/100;SEA5=THRU_SPR/100;SEA6=THRU_SPR/100;
    SEA7=THRU_SUM/100;SEA8=THRU_SUM/100;SEA9=THRU_SUM/100;
    SEA10=THRU_FAL/100;SEA11=THRU_FAL/100;SEA12=THRU_FAL/100;
*;
*     DAILY FRACTIONS
;
    DO _I_=1 TO 12;
      DAY=1/(13*DAYS);
    END;
    IF DAYS=1 THEN DO;
      DAY1=0;
      DAY3=0;DAY4=0;
      DAY6=0;DAY7=0;
      DAY9=0;DAY10=0;
      DAY12=0;
    END;
    IF DAYS=2 THEN DO;
      DAY1=0;
      DAY4=0;
      DAY7=0;
      DAY10=0;
    END;
    IF DAYS>=3 AND DAYS<=5 THEN DO;
      DAY2=0;DAY3=0;
      DAY5=0;DAY6=0;
      DAY8=0;DAY9=0;
      DAY11=0;DAY12=0;
    END;
    IF DAYS=6 THEN DO;
      DAY3=0;
      DAY6=0;
      DAY9=0;
      DAY12=0;
    END;
*;
*     HOURLY FRACTIONS
;
    DO _I_=1 TO &NUMHRS;
      HOUR=1/HOURS;
    END;
    IF HOURS>=17 THEN DO;
      DO X=1 TO NUM_DAY;
        START=(X-1)*24+1+HOURS;
        FINISH=START+23-HOURS;
        DO _I_=START TO FINISH;
          HOUR=0;
        END;
      END;
    END;
    ELSE DO;
```

```
      DO X=1 TO NUM_DAY;
        START=(X-1)*24+1;
        FINISH=START+6;
        DO _I_=START TO FINISH;
          HOUR=0;
        END;
        FINISH=START+23;
        START=START+HOURS+7;
        DO _I_=START TO FINISH;
          HOUR=0;
        END;
      END;
    END;
    OUTPUT TEMP5.NOSCC;
  END;
*;
*---- GENERATE UNIFORM PATTERNS-NO OPERATING DATA.
;
  ELSE IF IN1 THEN DO;
*;
*     SEASONAL AND DAILY FRACTIONS
;
      NUM_DAY=&TAFDAY;
    DO _I_=1 TO NUM_DAY;
      SEA=0.250;
      DAY=0.011;
    END;
*;
*     HOURLY FRACTIONS
;
    DO _I_=1 TO &NUMHRS;
      HOUR=0.042;
    END;
    OUTPUT TEMP2.NOOP;
  END;
*;
***** MERGE SUBFILES TO FORM FINAL, TEMPORALLY RESOLVED EMISSIONS FILE.
;
DATA OUTFILE.&SASMEM(DROP=HOURS DAYS WEEKS THRU_WIN THRU_SPR THRU_SUM
  THRU_FAL);
  SET TEMP1.CTY TEMP3.ST TEMP4.SCC TEMP5.NOSCC TEMP2.NOOP;
  BY EISSCC STATE COUNTY PLANT_ID POINT_ID;
*;
%MEND PSTAF;
*
;
***** MACRO EXECUTE

***** CONTROLS TAM PROCESSING BASED ON SOURCE TYPE BY ATTACHING
      TIME ZONE FILE AND CALLING PROPER TAF MERGE MACRO.
;
%MACRO EXECUTE;
*;
***** INPUT AND SORT TIME ZONE FILE.
;
DATA TIMEZONE; INFILE TZF;
  INPUT @1 STATE 2. COUNTY 4. ZONE 1. DAYLITE 1.;
*;
*     ADJUST TO GREENWICH MEAN TIME.
;
  ZONE=ZONE+4;
```

```
*;
PROC SORT DATA=TIMEZONE; BY STATE COUNTY;
*;
***** SUBSET EMISSION FILE IN ORDER TO RE-SORT AND MERGE WITH TIMEZONE.
      PROCESSING IS DIFFERENT FOR AREA AND POINT SOURCES.
;
%LET VARS=%STR(EISSCC STATE COUNTY PLANT_ID POINT_ID);
DATA SUBSET(KEEP=&VARS); SET INFILE.&SASMEM;
*;
*---- SORT SUBSET
;
PROC SORT DATA=SUBSET; BY STATE COUNTY;
*;
*---- MERGE SUBSET WITH TIMEZONE OUTPUT
;
DATA SUBTIME; MERGE SUBSET(IN=INA) TIMEZONE;
  BY STATE COUNTY;
  IF INA;
*;
*---- RE-SORT SUBTIME
;
PROC SORT DATA=SUBTIME; BY &VARS;
*;
*---- MERGE BACK TO MAIN FILE. RECORDS NO TZF DATA ARE OUTPUT TO NOTIME
;
DATA TEMP.EMISS OUTFILE.NOTIME(DROP=ZONE DAYLITE);
  MERGE INFILE.&SASMEM SUBTIME;
  BY &VARS;
  IF ZONE NE . THEN OUTPUT TEMP.EMISS;
  ELSE OUTPUT OUTFILE.NOTIME;
*;
***** APPLY TEMPORAL ALLOCATION FACTORS
;
%PSTAF
*;
%MEND EXECUTE;
*
;
***** MACRO DETAIL

***** PRINT OUT TEMPORALLY RESOLVED EMISSION FILE.
;
%MACRO DETAIL;
%*;
*;
*---- PRINT IDENTITY OF RECORDS WITH NO TIMEZONE DATA.
;
PROC PRINT DATA=OUTFILE.NOTIME;
  VAR STATE COUNTY;
  TITLE 'STATE-COUNTY CODES WITHOUT TIMEZONE DATA';
  FORMAT STATE Z2. COUNTY Z4.;
*;
*---- PRINT TEMPORALLY RESOLVED EMISSION FILE IF REQUESTED.
;
%IF &DETAIL=0 %THEN %DO;
  PROC PRINT DATA=OUTFILE.&SASMEM;
  ID EISSCC STATE COUNTY PLANT_ID POINT_ID;
  FORMAT EISSCC Z8. STATE Z2. COUNTY Z4. ZONE 1. DAYLITE 1.
    NUM DAY 2. SEA1-SEA12 4.3 DAY1-DAY12 5.4 HOUR1-HOUR288 4.3;
  VAR ZONE DAYLITE NUM DAY SEA1-SEA12 DAY1-DAY12 HOUR1-HOUR288;
  TITLE 'EMPLOYED TEMPORAL FACTORS';
```

```
%END;
%*;
%MEND DETAIL;
*
;
************************
* END MACRO DEFINITIONS *
************************
*;
********************
* MAIN PROGRAM: TAM *
********************

***** THIS PROGRAM WILL:
                1. READ THE CONTROL OPTIONS FILE.
                2. READ THE TIMEZONE FILE AND MERGE WITH EMISSIONS FILE.
                3. READ, SORT AND SUBDIVIDE TEMPORAL ALLOCATION FACTORS.
                4. MERGE FACTORS WITH EMISSION RECORDS.
                5. GENERATE FACTORS FOR EMISSION RECORDS WITHOUT TAF.
                6. PRODUCE DIAGNOSTIC REPORT.
;
***** READ CONTROL FILE.
;
DATA ONE(DROP=TYPE);INFILE COF EOF=WRITE;
  RETAIN SCE DETAIL SASMEM TAFDAY RUN_ID;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION)
;
  IF TYPE=1 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 1 RECORDS
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN COF';
      ABORT;
    END;
*;
*     INPUT AND CHECK DATA
;
    INPUT @3 SCE $2. @6 DETAIL $1. @8 SASMEM $8. @17 TAFDAY 2. @20

          RUN_ID $52.;
    IF SCE NE 'PS' THEN DO;
      PUT '*** FATAL: INVALID SOURCE TYPE ' SCE=;
      ABORT;
    END;
    IF DETAIL NE 'D' AND DETAIL NE 'S' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT ' DETAIL=;
      ABORT;
    END;
    RETURN;
  END;
*;
*---- INVALID CONTROL RECORD
;
  IF TYPE NE 1 THEN DO;
    PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
    ABORT;
  END;
```

```
*;
*---- OUTPUT CONTROL FILE DATA
;
WRITE: OUTPUT;
*;
*---- CREATE MACRO VARIABLES FOR TAM PROCESSING
;
CALL SYMPUT('TAFDAY',TAFDAY);
CALL SYMPUT('SASMEM',SASMEM);
RUN;
*;
***** CALL TAM PROCESSING MACRO
;
%EXECUTE
*;
***** DIAGNOSTIC REPORT
;
DATA _NULL_;SET ONE;
  FILE PRINT NOTITLES;
  IF DETAIL='D' THEN REPO='DETAILED';ELSE REPO=' SUMMARY';
  DT=DATE();TM=TIME();
  RUNCOL=66-LENGTH(RUN_ID)/2;
*;
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @100 'TEMPORAL ALLOCATION MODULE (TAM)'//
      @2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*;
*---- TYPE 1 RECORD
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SCE ' DETAIL: '
      DETAIL ' RUN ID: ' RUN_ID//@44
      'NUMBER OF DAYS IN TEMPORAL ALLOCATION FILE: ' TAFDAY;
  PUT _PAGE_;
*;
*---- END OF SUMMARY REPORT. CALL MACRO FOR DETAILED REPORT.
;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('SASMEM',SASMEM);
RUN;
%DETAIL
*;
***********************
* END OF MAIN PROGRAM *
***********************
;
```

```
OPTIONS DQUOTE MPRINT;
*----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: TEMPORAL ALLOCATION MODULE (TAM) - AREA SOURCES

  LANGUAGE: SAS (VERSION 5.08)

  PURPOSE: TO APPLY TEMPORAL ALLOCATION FACTORS AND TIMEZONE DATA
           TO EMISSION RECORDS.

  VARIABLE LIST: CONTROL OPTIONS FILE

NAME         ROUTINE                  DESCRIPTION
=======================================================================
TYPE           MAIN       CONTROL OPTIONS RECORD TYPE
SCE            MAIN       SOURCE TYPE OF EMISSION FILE
DETAIL         MAIN       LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
SASMEM         MAIN       SAS MEMBER NAME OF INPUT EMISSION FILE
TAFDAY         MAIN       NUMBER OF TEMPORAL SCENARIO DESIRED
RUN_ID         MAIN       RUN IDENTIFICATION HEADER
DAYLITE        MAIN       DAYLIGHT SAVINGS INDICATOR
LIST           MAIN       POLLUTANT VARIABLE LIST
EMRES          MAIN       EMISSIONS RESOLUTION SPECIFICATION
LIST           MAIN       POLLUTANT VARIABLE LIST

  VARIABLE LIST: TEMPORAL ALLOCATION FACTOR FILE

NAME         ROUTINE                  DESCRIPTION
=======================================================================
TAFCODE        ASTAF      SEASON-DAY CODE
STATE          ASTAF      STATE CODE
COUNTY         ASTAF      COUNTY CODE
EISSCC         ASTAF      SCC CODE
SEA            ASTAF      SEASONAL FRACTION
DAY            ASTAF      DAILY FRACTION
HOUR1-24       ASTAF      HOURLY FRACTIONS

  VARIABLE LIST: ADDITIONS TO EMISSION FILE

NAME         ROUTINE                  DESCRIPTION
=======================================================================
GMT1-24        ASTAF      TEMPORAL FRACTIONS OFFSET TO GMT

  VARIABLE LIST: GENERAL

NAME         ROUTINE                  DESCRIPTION
=======================================================================
START          ASTAF      STARTING POINT OF HOUR ARRAY FOR DAY NUM_DAY
FINISH         ASTAF      ENDING POINT OF HOUR ARRAY FOR DAY NUM_DAY
_I_            ASTAF      INDEX FOR ARRAYS
INDX1          MAIN        TYPE 1 CONTROL RECORD COUNTER
VARS         EXECUTE       MACRO COMPILE FOR SUBSET CREATION AND SORT
IN1            ASTAF      MERGE INDICATOR
IN2            ASTAF      MERGE INDICATOR
NUMHRS         ASTAF      MACRO VARIABLE FOR SIZE OF ARRAY HOUR
TM             MAIN        SYSTEM TIME
DT             MAIN        SYSTEM DATE
MISS           ASTAF      MACRO VARIABLE FOR TAF DROP LIST
```

```
  ERROR HANDLING:
     ERRORS IN THE CONTROL FILE WILL HALT EXECUTION. TEMPORAL ALLOCATION
     FACTORS MUST HAVE FOR EACH SCC, STATE, COUNTY COMBINATION ONE
     RECORD FOR EACH DAY IN FILE.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD: TAM INPUTS AND CHECKS THE CONTROL OPTIONS FILE.
          THE TEMPORAL ALLOCATION FACTORS ARE READ, DIVIDED BY
          LEVEL OF SPECIFICITY, AND MERGED WITH THE EMISSION FILE.
          FOR EMISSION RECORDS WITH MISSING TEMPORAL DATA, PATTERNS ARE
          GENERATED USING OPERATING RATE DATA. THE DIAGNOSTIC REPORT IS
          PRINTED.

PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, SEPTEMBER 1985
  UPDATED:    DON NEAL JULY 1986
              ANDREW A[illegible]ERMAN, ALLIANCE TECH CORP, JUNE 1987


*----------------------------------------------------------------------*
;
*********************
* MACRO DEFINITIONS *
*********************
;
***** MACRO ASTAF

***** MERGE AREA SOURCE EMISSIONS (FILE TEMP.EMISS) WITH TEMPORAL
      ALLOCATION FACTORS. TAF ARE READ, DIVIDED INTO SPECIFIC LEVELS
      (SCC, STATE, COUNTY) AND MERGED. NON-MATCHES ARE ASSIGNED
      A UNIFORM DISTRIBUTION.
;
%MACRO ASTAF;
*;
***** INPUT TEMPORAL ALLOCATION FACTORS AND DIVIDE. TAFF IS ASSUMED
      TO BE SORTED BY SCC, STATE, COUNTY, TAFCODE, AS WELL AS QA-ED.
;
%LET TAFDAY=%EVAL(&TAFDAY);
%LET MISS=%STR((DROP=NUM_DAY SEA DAY HOUR1-HOUR24));
%LET EMRES=%SUBSTR(&EMRES,1,1);
DATA SCCTAF(DROP=STATE) STTAF;
  INFILE TAFF;
  ARRAY HOUR HOUR1-HOUR24;
  DROP SEA DAY;
  INPUT @1 NUM_DAY 2. @;
*;
*---- CHECK FOR PROPER TAF SET;
*;
  IF NUM_DAY=&TAFDAY THEN DO;
*;
*     INPUT DATA;
*;
    INPUT STATE 2. +4 EISSCC 8. SEA 3.3 DAY 4.4 @;
*;
*     INPUT HOURLY DATA AND MULTIPLY BY SEASONAL AND DAILY FACTORS;
*;
    DO  I =1 TO 24;
      INPUT HOUR 3.3 @;
      HOUR=HOUR*SEA*DAY;
    END;
```

```
*;
*     OUTPUT DATA TO PROPER FILE;
*;
    IF STATE NE . THEN OUTPUT STTAF;
    ELSE OUTPUT SCCTAF;
*;
  END;
*;
***** MERGE TAF FILES WITH TEMP.EMISS
;
*;
*---- STATE SPECIFIC
;
DATA STATE.DATA TEMP.NOSTATE&MISS;
  MERGE STTAF(IN=IN2) TAMIN.&SASMEM(IN=IN1);
  BY EISSCC STATE;
  IF IN1 AND IN2 THEN OUTPUT STATE.DATA;
  ELSE IF IN1 THEN OUTPUT TEMP.NOSTATE;
*;
*---- SCC SPECIFIC
;
DATA SCC.DATA;
  MERGE SCCTAF(IN=IN2) TEMP.NOSTATE(IN=IN1);
  BY EISSCC;
  ARRAY HOUR HOUR1-HOUR24;
  IF IN1;
*;
*---- OUTPUT IF TEMPORAL FACTORS PRESENT OTHERWISE UNIFORM PATTERN;
*;
  IF HOUR1 NE . THEN DO;
    OUTPUT;
  END;
  ELSE DO;
    DO OVER HOUR;
      HOUR=0.0001155;
    END;
    OUTPUT;
  END;
*;
***** MERGE SUBFILES TO FORM FINAL, TEMPORALLY RESOLVED EMISSIONS FILE.
;
  DATA TAMOUT;
    SET STATE.DATA SCC.DATA;
    FILE SORTIN;
    BY EISSCC STATE;
    ARRAY HOUR HOUR1-HOUR24;
    ARRAY GMT(A) GMT1-GMT24;
    DROP A ZONE DAYLITE HOUR1-HOUR24;
*;
*---- OFFSET HOURLY DATA TO GMT
*;
*     CHECK FOR DAYLIGHT SAVINGS TIME;
*;
%IF &DAYLITE=Y %THEN %DO;
  ZONE=ZONE-DAYLITE;
%END;
*;
*     OFFSET HOURLY FRACTIONS;
*;    DO  I =1 TO 24;
       A=ZONE+ I ;
      IF A>24 THEN A=A-24;
      GMT=HOUR;
    END;
*;
*---- OUTPUT OBSERVATION IN EBCDIC;
*;
  %IF &EMRES=G %THEN
    %LET EMID=%STR(COL 4. ROW 4.);
  %ELSE
    %LET EMID=%STR(EISSCC 8. STATE 2. COUNTY 4.);
*;
  PUT @1 &EMID (&LIST GMT1-GMT24) (E10.);
*;
*---- OUTPUT TO TAMOUT FOR DETAILED REPORT;
*;
  IF FIRST.STATE;
*;
%MEND ASTAF;
*
,
;
;
***** MACRO DETAIL

***** PRINT OUT TEMPORALLY RESOLVED EMISSION FILE.
;
%MACRO DETAIL;
%*;
*;
*---- PRINT TEMPORALLY RESOLVED EMISSION FILE IF REQUESTED.
;
%IF &DETAIL=D %THEN %DO;
  PROC PRINT DATA=TAMOUT;
  ID EISSCC STATE;
  FORMAT EISSCC Z8. STATE Z2.;
  VAR GMT1-GMT24;
  TITLE 'TAM ADDITIONS TO EMISSION RECORDS';
%END;
%*;
%MEND DETAIL;
*
;
*************************
* END MACRO DEFINITIONS *
*************************
*;
*********************
* MAIN PROGRAM: TAM *
*********************

***** THIS PROGRAM WILL:
                1. READ THE CONTROL OPTIONS FILE.
                2. READ, SUBSET, SORT AND SUBDIVIDE TAFS
                3. MERGE FACTORS WITH EMISSION RECORDS.
                4. OFFSET HOURLY FACTORS TO GMT.
                5. SORT BY COLUMN AND ROW.
                6. OUTPUT DATA IN EBCDIC.
                7. PRODUCE DIAGNOSTIC REPORT.
;
***** READ CONTROL FILE.
;
```

```
DATA ONE(DROP=TYPE);INFILE COF EOF=WRITE;
  RETAIN SCE DETAIL SASMEM TAFDAY RUN_ID LIST DAYLITE EMRES;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION)
;
  IF TYPE=1 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 1 RECORDS
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN COF';
      ABORT;
    END;
*;
*     INPUT AND CHECK DATA
;
    INPUT @3 SCE $2. @6 DETAIL $1. @8 SASMEM $8. @17 TAFDAY 2. @20
          DAYLITE $1. @22 RUN_ID $50.;
    IF SCE NE 'AS' THEN DO;
      PUT '*** FATAL: INVALID SOURCE TYPE ' SCE=;
      ABORT;
    END;
    IF DETAIL NE 'D' AND DETAIL NE 'S' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT ' DETAIL=;
      ABORT;
    END;
    IF DAYLITE NE 'Y' AND DAYLITE NE 'N' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DAYLIGHT SAVINGS TIME';
      ABORT;
    END;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (POLLUTANT VARIABLE LIST);
*;
  IF TYPE=2 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 2 RECORDS;
*;
    INDX2+1;
    IF INDX2>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 2 RECORD IN COF';
      ABORT;
    END;
*;
*     INPUT DATA;
*;
    INPUT @3 LIST $70.;
*;
    RETURN;
  END;
*;
*---- TYPE 3 CONTROL RECORD (EMISSIONS RESOLUTION);
*;
  IF TYPE=3 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 3 RECORDS;
*;
    INDX3+1;
    IF INDX3>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 3 RECORD IN COF';
      ABORT;
    END;
*;
*     INPUT AND CHECK DATA;
*;
    INPUT @3 EMRES $10.;
    IF EMRES NE 'GRIDDED' AND EMRES NE 'NONGRIDDED' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR EMISSIONS RESOLUTION' EMRES=;
      ABORT;
    END;
*;
    RETURN;
  END;
*;
*---- INVALID CONTROL RECORD
;
  IF TYPE <1 OR TYPE >3 THEN DO;
    PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
    ABORT;
  END;
*;
*---- OUTPUT CONTROL FILE DATA
;
WRITE: OUTPUT;
*;
*---- CREATE MACRO VARIABLES FOR TAM PROCESSING
;
CALL SYMPUT('TAFDAY',TAFDAY);
CALL SYMPUT('SASMEM',SASMEM);
CALL SYMPUT('LIST',LIST);
CALL SYMPUT('DAYLITE',DAYLITE);
CALL SYMPUT('EMRES',EMRES);
RUN;
*;
***** CALL TAM PROCESSING MACRO
;
%ASTAF
*;
***** DIAGNOSTIC REPORT
;
DATA _NULL_;SET ONE;
  FILE PRINT NOTITLES;
  IF DETAIL='D' THEN REPO='DETAILED';ELSE REPO=' SUMMARY';
  DT=DATE();TM=TIME();
  RUNCOL=66-LENGTH(RUN_ID)/2;
*;
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @100 'TEMPORAL ALLOCATION MODULE (TAM)'//
      @2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*;
*---- TYPE 1 RECORD
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SCE ' DETAIL: '
      DETAIL ' RUN ID: ' RUN ID//@44
```

```
     'TEMPORAL SCENARIO PROCESSED: ' TAFDAY//;
*;
*---- TYPE 2 RECORD
*;
  PUT @2 'POLLUTANT IDENTIFICATION RECORD:'//@7 'VARIABLE LIST: '
         LIST $70.//;
*;
*---- TYPE 3 RECORD
*;
  PUT @2 'EMISSIONS RESOLUTION RECORD:'//@7 'EMISSIONS RESOLUTION: '
        EMRES;
  PUT _PAGE_;
*;
*---- END OF SUMMARY REPORT. CALL MACRO FOR DETAILED REPORT.
;
CALL SYMPUT('DETAIL',DETAIL);
RUN;
%DETAIL
*;
***********************
* END OF MAIN PROGRAM *
***********************
 ;
```

```
C***********************************************************************
      PROGRAM MTPREP
C***********************************************************************
C
C     MTPREP - TAM AREA SOURCE MODELER'S TAPE PREPPOCESSOR
C
C     PROGRAM TAKES EMISSIONS WITH HOURLY TEMPORAL ALLOCATION
C     FACTORS, MULTIPLIES THEM, AND CALCULATES TOTALS.
C     FOR GRIDDED EMISSIONS (INDICATED BY EMRES IN COF),
C     TOTALS ARE CALCULATED FOR EACH COL, ROW PAIR;
C     FOR NON-GRIDDED EMISSIONS, TOTALS ARE CALCULATED FOR EACH
C     SCC, STATE, COUNTY COMBINATION.
C
C     INPUT
C       CONTROL OPTIONS FILE - FT10F001
C       EMISSIONS            - FT11F001
C     OUTPUT                 - FT20F001
C
C     PROGRAMMER - ANDREW ACKERMAN, ALLIANCE TECH CORP, JUNE 1987
C
C***********************************************************************
      COMMON POLL,FACT,TOT
      CHARACTER*10 EMRES
      REAL POLL(100),FACT(24),TOT(24,100)

C     READ NUMBER OF POLLUTANTS (NPOLL) AND EMISSIONS RESOLUTION (EMRES)
      READ(10,10) NPOLL,EMRES
   10 FORMAT(I3,1X,A10)

C     CHECK COF AND CALL APPROPRIATE SUBROUTINE FOR PROCESSING
      IF (NPOLL.GT.100) THEN
        PRINT 20,NPOLL
   20   FORMAT(1X,'*** FATAL:  NUMBER OF POLLUTANTS SPECIFIED IN COF ',
     &         ' EXCEEDS 100, NPOLL=',A10)
        STOP
      ELSE
        IF (EMRES.EQ.'GRIDDED   ') THEN
          CALL GRD(NPOLL)
        ELSE
          IF (EMRES.EQ.'NONGRIDDED') THEN
            CALL NONGRD(NPOLL)
          ELSE
            PRINT 30,EMRES
   30       FORMAT(1X,'*** FATAL:  INVALID EMISSIONS RESOLUTION ',
     &             'SPECIFIED IN COF, EMRES=',A10)
            STOP
          ENDIF
        ENDIF
      ENDIF

      END
C***********************************************************************
      SUBROUTINE GRD(NPOLL)
C***********************************************************************
C
C     PROCESSES GRIDDED EMISSIONS
C
C***********************************************************************
      COMMON POLL,FACT,TOT
      INTEGER COL,ROW,TCOL,TROW
      LOGICAL EOF
      REAL POLL(100),FACT(24),TOT(24,100)

C    SET ROW AND COL - STARTUP ONLY
      READ(11,10) COL,ROW
   10 FORMAT(2I4)
      BACKSPACE 11

C    CLEAR TOTALS, TOT
   20 CONTINUE
      DO 30 IHR = 1, 24
      DO 30 IPOLL = 1, NPOLL
   30 TOT(IHR,IPOLL) = 0.0

   40 CONTINUE
C      READ NEXT RECORD
        EOF = .TRUE.
        READ(11,50,END=99) TCOL,TROW,(POLL(J),J=1,NPOLL),
     &                    (FACT(J),J=1,24)
   50   FORMAT(2I4,124E10.3)
        EOF = .FALSE.

        IF (TCOL.EQ.COL .AND. TROW.EQ.ROW) THEN
C        MULTIPLY EMISSIONS BY FACTORS AND ACCUMULATE TOTALS
          DO 60 IHR = 1, 24
          DO 60 IPOLL = 1, NPOLL
   60     TOT(IHR,IPOLL) = TOT(IHR,IPOLL) + FACT(IHR)*POLL(IPOLL)
          GOTO 40

        ELSE
C        OUTPUT AND REINITIALIZE
   99     CONTINUE
          DO 70 IHR = 1, 24
            WRITE(20,80) COL,ROW,IHR,(TOT(IHR,J),J=1,NPOLL)
   80       FORMAT(2I4,I2,1P,100E10.3)
   70     CONTINUE
          IF (EOF) RETURN
          COL = TCOL
          ROW = TROW
          BACKSPACE 11
          GOTO 20
        ENDIF

      END
C***********************************************************************
      SUBROUTINE NONGRD(NPOLL)
C***********************************************************************
C
C     PROCESSES NON-GRIDDED EMISSIONS
C
C***********************************************************************
      COMMON POLL,FACT,TOT
      INTEGER SCC,ST,CO,TSCC,TST,TCO
      LOGICAL EOF
      REAL POLL(100),FACT(24),TOT(24,100)

C    SET SCC, ST, AND CO - STARTUP ONLY
      READ(11,10) SCC,ST,CO
   10 FORMAT(I8,I2,I4)
      BACKSPACE 11
```

```
C     CLEAR TOTALS, TOT
   20 CONTINUE
      DO 30 IHR = 1, 24
      DO 30 IPOLL = 1, NPOLL
   30 TOT(IHR,IPOLL) = 0.0

   40 CONTINUE
C       READ NEXT RECORD
        EOF = .TRUE.
        READ(11,50,END=99) TSCC,TST,TCO,(POLL(J),J=1,NPOLL),
     &                    (FACT(J),J=1,24)
   50   FORMAT(I8,I2,I4,124E10.3)
        EOF = .FALSE.

        IF (TSCC.EQ.SCC .AND. TST.EQ.ST .AND. TCO.EQ.CO) THEN
C         MULTIPLY EMISSIONS BY FACTORS AND ACCUMULATE TOTALS
          DO 60 IHR = 1, 24
          DO 60 IPOLL = 1, NPOLL
   60     TOT(IHR,IPOLL) = TOT(IHR,IPOLL) + FACT(IHR)*POLL(IPOLL)
          GOTO 40

        ELSE
C         OUTPUT AND REINITIALIZE
   99     CONTINUE
          DO 70 IHR = 1, 24
            WRITE(20,80) SCC,ST,CO,IHR,(TOT(IHR,J),J=1,NPOLL)
   80       FORMAT(I8,I2,I4,I2,1P,100E10.3)
   70     CONTINUE
          IF (EOF) RETURN
          SCC = TSCC
          ST = TST
          CO = TCO
          BACKSPACE 11
          GOTO 20
        ENDIF

      END
```

```
OPTIONS MPRINT;
*-------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM:  TAM AREA SOURCE MODELER'S TAPE PREPROCESSOR
            (SAS COMPLEMENT TO FORTRAN MTPREP)

  LANGUAGE:  SAS (VERSION 5.16)

  PURPOSE:  TO READ EBCDIC OUTPUT FROM MTPREP.FORT INTO A SAS DATA SET

  VARIABLE LIST

NAME                          DESCRIPTION
====================================================================
NUMPOLL             NUMBER OF POLLUTANTS IN EMISSIONS FILE
EMRES               EMISSIONS RESOLUTION (GRIDDED OR NONGRIDDED)
GMT                 HOUR OF EMISSIONS (GREENWICH MEAN TIME)
COL                 GRID COLUMN
ROW                 GRID ROW
EISSCC              SOURCE CLASSIFICATION CODE
STATE               STATE CODE
COUNTY              COUNTY CODE
TOT1-TOT&NUMPOLL    EMISSIONS TOTALS


  ERROR HANDLING:  INVALID VALUES IN CONTROL OPTIONS FILE WILL
                   HALT EXECUTION.

  METHOD:  READS AND CHECKS CONTROL OPTIONS FILE.  INPUTS TEMPORALLY
           RESOLVED EMISSIONS FILE TO SAS.
  PROGRAMMER:  ANDREW ACKERMAN, ALLIANCE TECH CORP, JUNE 1987

*-------------------------------------------------------------------*

***** MACRO DEFINITION *****;

***** MACRO READSAS

***** READ EBCDIC EMISSIONS FILE INTO SAS
;
%MACRO READSAS;
%LET NUMPOLL = %EVAL(&NUMPOLL);
%LET EMRES = %SUBSTR(&EMRES,1,1);
%*;
DATA OUTFILE.DATA;
  INFILE INFILE;
  %IF &EMRES=G %THEN %LET EMID=%STR(COL 4. ROW 4.);
  %ELSE %LET EMID=%STR(EISSCC 8. STATE 2. COUNTY 4.);
  INPUT @1 &EMID GMT 2. (TOT1-TOT&NUMPOLL) (E10.);
%*;
%MEND READSAS;

***** END OF MACRO DEFINITION *****;

***** READ CONTROL OPTIONS FILE
;
DATA _NULL_;
  INFILE COF;
  INPUT @1 NUMPOLL 3. @5 EMRES $10.;

* CHECK FOR INVALID COF DATA;
  IF NUMPOLL < 1 THEN DO;
    PUT '*** FATAL: INVALID NUMBER OF POLLUTANTS' NUMPOLL=;
    ABORT;
    END;
  ELSE IF EMRES NE 'GRIDDED' AND EMRES NE 'NONGRIDDED' THEN DO;
    PUT '*** FATAL:  INVALID EMISSIONS RESOLUTION' EMRES=;
    ABORT;
    END;

* BRIEF DIAGNOSTIC REPORT (ECHO COF);
  FILE PRINT NOTITLES;
  PUT // @2 '*** MTPREP DIAGNOSTIC REPORT ***'//
         @2 '    NUMBER OF POLLUTANTS: ' NUMPOLL= /
         @2 '    EMISSIONS RESOLUTION: ' EMRES=;
*;
CALL SYMPUT('NUMPOLL',NUMPOLL);
CALL SYMPUT('EMRES',EMRES);
RUN;
%READSAS
```

APPENDIX C

SPECIATION MODULE SOURCE CODE

```
OPTIONS NOSOURCE DQUOTE;
*-----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: SPECIATION MODULE (SM) - POINT SOURCES

  LANGUAGE: SAS (VERSION 5.08)

  PURPOSE: TO APPLY SPECIATION FACTORS TO THE EMISSION RECORDS
           OUTPUT FROM MDEM OR TAM

  VARIABLE LIST: CONTROL OPTIONS FILE

NAME          ROUTINE                 DESCRIPTION
=========================================================================
TYPE           MAIN       CONTROL OPTIONS RECORD TYPE
SCE            MAIN       SOURCE TYPE OF EMISSION FILE
DETAIL         MAIN       LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
SASMEM         MAIN       SAS MEMBER NAME OF EMISSION FILE
RUN_ID         MAIN       RUN IDENTIFICATION HEADER
INDX1          MAIN       NUMBER OF TYPE 1 RECORDS
INDX2          MAIN       NUMBER OF TYPE 2 RECORDS
MAJCAT1-15     MAIN       SAROAD CODES OF POLLUTANT CATEGORIES TO BE
                          SPECIATED
NUM_SP1-15     MAIN       NUMBER OF SPECIES IN EACH POLLUTANT CATEGORY
TOT_SP         MAIN       TOTAL NUMBER OF SPECIES

  VARIABLE LIST: PSPLIT OUTPUT FILE

NAME          ROUTINE                 DESCRIPTION
=========================================================================
CAT1-30        MAIN       SAROAD CODE FOR THC POLLUTANT CATEGORY
CLASS1-30      MAIN       SAROAD CODE FOR THC SUBCLASSES
SF1-30         MAIN       SPECIATION FACTORS FOR EACH THC SUBCLASS
CAT31-32       MAIN       SAROAD CODE FOR NITROGEN OXIDES
CLASS31-32     MAIN       SPECIATION FACTORS FOR EACH NOX SUBCLASS
EISSCC         MAIN       SCC CODE
STATE          MAIN       STATE CODE
COUNTY         MAIN       COUNTY CODE
PLANT_ID       MAIN       PLANT ID
POINT_ID       MAIN       POINT ID
HCHOWT         MAIN       HC ADJUSTMENT FOR ALDEHYDE AND METHANE

  VARIABLE LIST: SPECIATION FACTOR FILE

NAME          ROUTINE                 DESCRIPTION
=========================================================================
CAT33-TOT_SP  SFFIN       SAROAD CODE FOR POLLUTANT CATEGORIES
CLASS33-TOT_SP SFFIN      SAROAD CODES FOR SUBCLASSES
SF33-TOT_SP    SFFIN      SPECIATION FACTORS FOR EACH SUBCLASS
EISSCC         SFFIN      SCC CODE
STATE          SFFIN      STATE CODE
COUNTY         SFFIN      COUNTY CODE
PLANT_ID       SFFIN      PLANT ID
POINT_ID       SFFIN      POINT ID

  VARIABLE LIST: ADDITIONS TO EMISSION FILE

NAME          ROUTINE                 DESCRIPTION
```

```
======================================================================
CAT1-TOT_SP  SORTMER      SAROAD CODE OF POLLUTANT CATEGORY
CLASS1-TOT_SP SORTMER     SAROAD CODE OF POLLUTANT SUBCLASS
SF1-TOT_SP   SORTMER      SPECIATION FACTOR OF POLLUTANT SUBCLASS
NUMSP        SORTMER      TOTAL NUMBER OF SPECIATION FACTORS
HCHONT       SORTMER      HC ADJUSTMENT FOR ALDEHYDE AND METHANE

  VARIABLE LIST: GENERAL

NAME         ROUTINE              DESCRIPTION
======================================================================
TM             MAIN       SYSTEM TIME
DT             MAIN       SYSTEM DATE
ARRDEX        SFFIN       ARRAY OFFSET FOR PSPLIT SFF
_N_           SFFIN       NUMBER OF DATA STEP ITERATIONS
_I_           SFFIN       ARRAY INDEX
A             SFFIN       INDEX FOR NUMBER OF CATS IN COF
B             SFFIN       INDEX OFFSET FOR SFF
C             SFFIN       INDEX FOR NUMBER OF SPECIES IN CAT B
IN           SORTMER      SAS DATA LIBRARY MEMBER NAME
IN1          SORTMER      MERGE VARIABLE
IN2          SORTMER      MERGE VARIABLE
REPO           MAIN       REPORT DETAIL LABEL
RUNCOL         MAIN       COLUMN REQUIRED TO CENTER RUN ID

  ERROR HANDLING:
     ERRORS IN THE CONTROL FILE WILL HALT PROGRAM EXECUTION.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD: SM INPUTS AND CHECKS THE CONTROL OPTIONS FILE.  THE PSPLIT
          OUTPUT FILE AND THE SPECIATION FACTOR FILE ARE INPUT AND
          MERGED THEN SPLIT INTO SPECIATION FACTOR FILES (SPEC) WITH
          DIFFERENT DEGREES OF SPECIFICITY. THE SFF'S ARE MERGED WITH
          THE EMISSION FILE AND A REPORT IS PRINTED.

  PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, AUGUST 1985

*--------------------------------------------------------------------*

;
*********************
* MACRO DEFINITIONS *
*********************
;
***** MACRO SFFIN

***** READS THE SPECIATION FACTOR FILE. PROVIDES VARIABLE NUMBER OF
      VARIABLES BASED ON NUMBER OF SPECIES IN SFF.

;
%MACRO SFFIN;
  %IF &TOT_SP>=1 %THEN %DO;
  %LET ARRDEX=%EVAL(&TOT_SP+32);
    DATA SFF; INFILE SFF;
      ARRAY CLASS CLASS33-CLASS&ARRDEX;
      ARRAY SF SF33-SF&ARRDEX;
      INPUT @1 EISSCC 8. @9 STATE 2. @11 COUNTY 4. @15 PLANT_ID $4.
            @19 POINT_ID $3. @;
      DO _I_=1 TO &TOT_SP;
        INPUT CLASS 5. SF 4.4 @;
      END;
 *;
```

```
*---- MERGE WITH COF AND ASSIGN POLLUTANT CATEGORIES
;
    DATA TWO(DROP=SCE DETAIL SASMEM RUN_ID INDX1 INDX2 TOT_SP
      NUM_SP1-NUM_SP15 MAJCAT1-MAJCAT15);
      IF _N_=1 THEN SET ONE;
      SET SFF;
      ARRAY CAT CAT33-CAT&ARRDEX;
      %LET C=%EVAL(1);
      %DO A=1 %TO &INDX2;
        %LET B=%EVAL(&A+2);
        DO _I_=&C TO NUM_SP&B+&C-1;
          CAT=MAJCAT&B;
        END;
        %LET C=NUM_SP&B+&C;
      %END;
*;
***** SORT SPECIATION FACTOR FILE
;
PROC SORT DATA=TWO; BY EISSCC;
*;
  %END;
%MEND SFFIN;
*
;
***** MACRO PSPMER

***** MERGE PSPLIT FILE WITH SFF IF SFF EXISTS
;
%MACRO PSPMER;
  DATA SPEC5;
    %IF &TOT_SP>=1 %THEN %DO;
      MERGE THREE TWO;
      BY EISSCC;
    %END;
    %ELSE %DO;
      SET THREE;
    %END;
    DROP PLANT_ID POINT_ID;
%MEND PSPMER;
*
;
***** MACRO SORTMER

***** MERGE EMISSION FILE WITH SPECIES FILE.
;
%MACRO SORTMER;
*;
%LET NUMSP=%EVAL(&NUMSP);
  DATA OUTFILE1.&SASMEM OUTFILE2.NOSPEC(DROP=NUMSP HCHOWT CAT1-CAT&NUMSP
  CLASS1-CLASS&NUMSP SF1-SF&NUMSP);
  MERGE SPEC5(IN=IN2) INFILE.&SASMEM(IN=IN1);
    BY EISSCC;
    NUMSP=&NUMSP;
    IF IN1 AND IN2 THEN OUTPUT OUTFILE1.&SASMEM;
    ELSE IF IN1 THEN OUTPUT OUTFILE2.NOSPEC;
*;
%MEND SORTMER;
*;
***** MACRO DETAIL
***** PRINT OUT DETAILED REPORT
```

```
;
%MACRO DETAIL;
*;
*---- PRINT NOSPEC (NO MATCH IN SPECIATION FILE)
;
PROC PRINT DATA=OUTFILE2.NOSPEC;
  VAR EISSCC STATE COUNTY
    PLANT_ID POINT_ID;
TITLE 'EMISSION RECORDS WITH NO SPECIATION PROFILE';
FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
%*;
%*--- CHECK COF FOR DETAIL
;
  %LET NUMSP=%EVAL(&NUMSP);
  %IF &DETAIL=D %THEN %DO;
    PROC PRINT DATA=OUTFILE1.&SASMEM;
    ID EISSCC STATE COUNTY PLANT_ID POINT_ID;
    VAR NUMSP HCHOWT CAT1-CAT&NUMSP CLASS1-CLASS&NUMSP SF1-SF&NUMSP;
    FORMAT EISSCC Z8. STATE Z2. COUNTY Z4. NUMSP 3. HCHOWT 5.4
      SF1-SF&NUMSP 5.4;
    TITLE 'EMPLOYED SPECIATION FACTORS';
  %END;
*;
%MEND DETAIL;
*;
*************************
* END MACRO DEFINITIONS *
*************************
;
********* **********
* MAIN PROGRAM: SM *
********************

***** THIS PROGRAM WILL:
                 1. READ THE CONTROL OPTIONS FILE
                 2. READ THE SPECIATION FACTOR FILE
                 3. READ THE PSPLIT OUTPUT FILE
                 4. MERGE AND SPLIT 2. AND 3.
                 5. MERGE WITH EMISSION FILE
                 6. PRODUCE A DIAGNOSTIC REPORT
;
***** READ THE CONTROL FILE
;
*---- OPEN FILES AND DEFINE ARRAYS
;
DATA ONE(DROP=TYPE); INFILE COF EOF=WRITE;
  ARRAY MAJCAT MAJCAT1-MAJCAT15;
  ARRAY NUM_SP NUM_SP1-NUM_SP15;
  RETAIN SCE DETAIL SASMEM MAJCAT1-MAJCAT15 NUM_SP1-NUM_SP15
         TOT_SP RUN_ID INDX2;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION)
;
  IF TYPE=1 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 1 RECORDS.
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*      INPUT AND CHECK DATA
;
    INPUT @3 SCE $2. @6 DETAIL $1. @8 SASMEM $8. @17 RUN_ID $56.;
    IF SCE NE 'PS' THEN DO;
      PUT '*** FATAL: INVALID SOURCE TYPE ' SCE=;
      ABORT;
    END;
    IF DETAIL NE 'D' AND DETAIL NE 'S' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT ' DETAIL=;
      ABORT;
    END;
    INDX2=0;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (SPECIATION FILE FORMAT).
;
  IF TYPE=2 THEN DO;
*;
*      CHECK FOR TOO MANY TYPE 2 RECORDS
;
    INDX2+1;
    IF INDX2>13 THEN DO;
      PUT '*** FATAL: TOO MANY POLLUTANT CLASSES SPECIFIED';
      ABORT;
    END;
*;
*      INPUT AND CHECK DATA
;
    IF INDX2=1 THEN _I_=3;
    INPUT @3 MAJCAT 5. @9 NUM_SP 2.;
    IF NUM_SP>30 THEN DO;
      PUT '*** FATAL: GREATER THAN 30 SUBCLASSES SPECIFIED';
      ABORT;
    END;
    TOT_SP+NUM_SP;
    _I_+1;
    RETURN;
  END;
*;
*---- INVALID CONTROL RECORD
;
  PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
  ABORT;
*;
*---- BEFORE OUTPUT, SET VALUES OF PSPLIT FILE (THC AND NOX)
;
WRITE: MAJCAT1=43101;
       MAJCAT2=42602;
       NUM_SP1=30;
       NUM_SP2=2;
       IF TOT_SP=. THEN TOT_SP=0;
       NUMSP=TOT_SP+32;
       OUTPUT;
*;
***** INPUT SPECIATION FACTOR FILE
;
*---- CREATE MACRO VARIABLES AND CALL INPUT MACRO
```

```
;
      CALL SYMPUT('TOT_SP',TOT_SP);
      CALL SYMPUT('INDX2',INDX2);
      CALL SYMPUT('SCE',SCE);
      RUN;
      %SFFIN
*;
***** INPUT PSPLIT OUTPUT FILE
;
DATA THREE(DROP=TYPE); INFILE PSPLIT;
  ARRAY CLASS CLASS1-CLASS30;
  ARRAY CAT CAT1-CAT30;
  ARRAY SF SF1-SF30;
  RETAIN CAT1-CAT32 CLASS1-CLASS32;
*;
*    INPUT RECORD TYPE
;
  INPUT @94 TYPE 1. @1 @;
*;
*    TYPE 1 RECORD (HEADER)
;
  IF TYPE=1 THEN DO;
    DO _I_=1 TO 15;
      CAT=43101;
      INPUT CLASS 5. @;
    END;
    INPUT;
    DO _I_=16 TO 30;
      CAT=43101;
      INPUT CLASS 5. @;
    END;
    CAT31=42602;
    CAT32=42602;
    CLASS31=42601;
    CLASS32=42602;
    RETURN;
  END;
*;
*     TYPE 2 RECORD (SPECIATION FACTORS)
;
  IF TYPE=2 THEN DO;
    INPUT @1 STATE 2. @3 COUNTY 4. @7 PLANT_ID $4. @11 POINT_ID $3.
          @14 EISSCC 8. @;
    DO _I_=1 TO 15;
      INPUT SF 4.4 @;
    END;
    INPUT HCHOWT 4.4 SF31 4.3 SF32 4.3;
    INPUT @22 @;
    DO _I_=16 TO 30;
      INPUT SF 4.4 @;
    END;
    OUTPUT;
    RETURN;
  END;
*;
*     BAD PSPLIT RECORD
;
  PUT '*** FATAL: BAD PSPLIT RECORD' TYPE=;
  ABORT;
*;
***** SORT PSPLIT OUTPUT
```

```
;
PROC SORT DATA=THREE; BY EISSCC;
*;
***** MERGE PSPLIT OUTPUT WITH SFF.
;
%PSPMER
*;
***** MERGE COMPLETE SPECIATION FACTORS WITH EMISSION FILE
;
*---- CALL A MACRO TO SORT EMISSION FILE THEN MERGE
;
DATA _NULL_;SET ONE;
  CALL SYMPUT('NUMSP',NUMSP);
  CALL SYMPUT('SASMEM',SASMEM);
  RUN;
  %SORTMER
*;
***** WRITE DIAGNOSTIC REPORT
;
*---- DEFINE FILE ASSIGN ARRAY AND INITIALIZE VARIABLES
;
DATA _NULL_;SET ONE;
  ARRAY MAJCAT MAJCAT1-MAJCAT15;
  ARRAY NUM_SP NUM_SP1-NUM_SP15;
  FILE PRINT NOTITLES;
  IF DETAIL='S' THEN REPO=' SUMMARY'; ELSE REPO='DETAILED';
  DT=DATE( );TM=TIME( );
  RUNCOL=66-LENGTH(RUN_ID)/2;
*;
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @110 'SPECIATION MODULE (SM)'//@2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*;
*---- PRINT TYPE 1 RECORD
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SCE: ' SCE ' DETAIL: '
      DETAIL ' SAS FILE: ' SASMEM 'RUN ID: ' RUN_ID///;
*;
*---- PRINT TYPE 2 RECORDS
;
IF INDX2>0 THEN DO;
  PUT @2 'SPECIATION FACTOR FILE DEFINITION RECORDS:'//
      @51 '             MAJOR'/
      @51 '           POLLUTANT    # OF'/
      @51 'RECORD #     SAROAD  SUBCLASSES'/
      @51 '-------------------------------'/;
  DO _I_=3 TO INDX2+2;
  NUMB=_I_-2;
    PUT @53 NUMB 2. @63 MAJCAT 5. @75 NUM_SP 2./;
  END;
  PUT @51 '-------------------------------'/_PAGE_;
END;
*;
*---- PROCESS DETAILED REPORT
;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('SCE',SCE);
CALL SYMPUT('SASMEM',SASMEM);
CALL SYMPUT('NUMSP',NUMSP);
RUN;
%DETAIL
*;
*******************
* END MAIN PROGRAM *
*******************
;
```

NOTE: This version of the Speciation Module-Point Sources is coded to process Version 5.2. For 5.3 processing, the following changes to the source code will be necessary throughout the program:

CAT30 to CAT10

CLASS30 to CLASS10

SF30 to SF10

CAT31 to CAT11

CAT32 to CAT12

CAT33 to CAT13

CLASS33 to CLASS13

SF33 to SF13

TOT_SP+32 to TOT_SP+12

NUM_SP1=30 to NUM_SP1=10

In addition, the following changes are required to specific lines of code:

_I_=1 to 30 to _I_=1 to 10 (lines 3270 and 3480). Delete lines 3320-3350 and 3530-3550. In line 3520, delete @22@.

```
OPTIONS NOSOURCE DQUOTE;
*----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: SPECIATION MODULE (SM) - AREA SOURCES

  LANGUAGE: SAS (VERSION 5.08)

  PURPOSE: TO APPLY SPECIATION FACTORS TO THE EMISSION RECORDS
           OUTPUT FROM MDEM AND CREATE SPECIATED EMISSIONS

  VARIABLE LIST: CONTROL OPTIONS FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
TYPE           MAIN       CONTROL OPTIONS RECORD TYPE
DETAIL         MAIN       LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
SASMEM         MAIN       SAS MEMBER NAME OF EMISSION FILE
RUN_ID         MAIN       RUN IDENTIFICATION HEADER
INDX1          MAIN       NUMBER OF TYPE 1 RECORDS
INDX2          MAIN       NUMBER OF TYPE 2 RECORDS
MAJCAT1-15     MAIN       VARIABLE NAMES OF MAJOR POLLUTANTS TO BE
                          SPECIATED
NUM_SP1-15     MAIN       NUMBER OF SPECIES IN EACH POLLUTANT CATEGORY
NUMSP          MAIN       TOTAL NUMBER OF SPECIES
PSPLIT         MAIN       NUMBER OF SPECIES IN PSPLIT OUTPUT FILE
SFF            MAIN       NUMBER OF SPECIES IN SFF FILE

  VARIABLE LIST: PSPLIT OUTPUT FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
CLASS          SFFIN      SAROAD CODE FOR THC OR NOX SUBCLASSES
SF             SFFIN      SPECIATION FACTOR FOR EACH THC OR NOX SUBCLASS
EISSCC         SFFIN      SCC CODE
STATE          SFFIN      STATE CODE
COUNTY         SFFIN      COUNTY CODE
PLANT_ID       SFFIN      PLANT ID
POINT_ID       SFFIN      POINT ID
HCHCNT         SFFIN      HC ADJUSTMENT FOR ALDEHYDE AND METHANE

  VARIABLE LIST: SPECIATION FACTOR FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
CLASS          SFFIN      SAROAD CODES FOR SUBCLASSES
SF             SFFIN      SPECIATION FACTORS FOR EACH SUBCLASS
EISSCC         SFFIN      SCC CODE
STATE          SFFIN      STATE CODE
COUNTY         SFFIN      COUNTY CODE
PLANT_ID       SFFIN      PLANT ID
POINT_ID       SFFIN      POINT ID

  VARIABLE LIST: ADDITIONS TO EMISSION FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
SF             SORTMER    SPECIATED EMISSIONS (TONS/YR OR MOLES/YR)
```

```
 VARIABLE LIST: GENERAL

NAME          ROUTINE              DESCRIPTION
===========================================================================
TM              MAIN          SYSTEM TIME
DT              MAIN          SYSTEM DATE
_N_             SFFIN         NUMBER OF DATA STEP ITERATIONS
_I_             SFFIN         ARRAY INDEX
IN             SORTMER        SAS DATA LIBRARY MEMBER NAME
IN1            SORTMER        MERGE VARIABLE
IN2            SORTMER        MERGE VARIABLE
REPO            MAIN          REFORT DETAIL LABEL
RUNCOL          MAIN          COLUMN REQUIRED TO CENTER RUN ID
ENDSFF         SORTMER        NUMBER OF LAST SPECIE
FIRST          SORTMER        SF NUMBER OF FIRST SPECIE WITHIN A MAJOR
                              POLLUTANT CATEGORY
LAST           SORTMER        SF NUMBER OF LAST SPECIE WITHIN A MAJOR
                              POLLUTANT CATEGORY
FACTOR         SORTMER        CONVERSION FOR THC EMISSIONS TO KG.
K              SORTMER        ARRAY COUNTER
ORDER           PSPMER        CODE FOR SPECIE ORDER IN EMISSION FILE
NO              SFFIN         SF NUMBER FOR NO
NO2             SFFIN         SF NUMBER FOR NO2
SFF              MAIN         NUMBER OF SPECIES IN SFF FILE
PSPLIT           MAIN         NUMBER OF SPECIES IN PSPLIT FILE
THCNUM          SFFIN         NUMBER OF THC SPECIES


  ERROR HANDLING:
     ERRORS IN THE CONTROL FILE WILL HALT PROGRAM EXECUTION.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD: SM INPUTS AND CHECKS THE CONTROL OPTIONS FILE.  THE PSPLIT
          OUTPUT FILE AND THE SPECIATION FACTOR FILE ARE INPUT AND
          MERGED.  THE SFF'S ARE MERGED WITH THE EMISSION FILE,
          MULTIPLIED BY THE MAJOR POLLUTANT CATEGORY, AND OUTPUT.
          A SUMMARY, EMISSION OR DETAILED REPORT IS PRINTED.

  PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, AUGUST 1985

  UPDATED:    DON NEAL, JULY 1986
---------------------------------------------------------------------*
*-
;
********************
* MACRO DEFINITIONS *
********************
;
*;
***** MACRO TIMEZONE;

***** APPLY TIMEZONE OFFSET TO EMISSION FILE;
*;
%MACRO TIMEZONE;
%*;
%*---- CREATE PROPER SORT STRING;
%*;
%*;
***** INPUT AND SORT TIME ZONE FILE;
*;
```

```
 DATA TIMEZONE;INFILE TZF;
   INPUT @1 STATE 2. COUNTY 4. ZONE 1. DAYLITE 1.;
*;
*     ADJUST TO GMT;
*;
   ZONE=ZONE+4;
*;
  PROC SORT DATA=TIMEZONE;BY STATE COUNTY;
;*;
***** SORT EMISSION FILE;
*;
  PROC SORT DATA=INFILE.&SASMEM OUT=SORTOUT;
  BY STATE COUNTY;
*;
***** MERGE TZF WITH EMISSIONS;
*;
  DATA TZFOUT ORPHAN.NOTIME;
    MERGE SORTOUT(IN=INA) TIMEZONE;
    BY STATE COUNTY;
    IF INA;
    IF ZONE=. THEN OUTPUT ORPHAN.NOTIME;
    ELSE OUTPUT TZFOUT;
*;
***** RESORT EMISSIONS;
*;
  PROC SORT DATA=TZFOUT;
      BY EISSCC STATE COUNTY;
*;
%MEND TIMEZONE;

***** MACRO SORTMER

***** MERGE EMISSION FILE WITH SPECIES FILE. MULTIPLY FACTORS BY
      ANNUAL POLLUTANTS. OUTPUT RECORDS WITHOUT SPECIATION FACTORS
      TO ORPHAN FILE.
;
%MACRO SORTMER;
*;
  DATA SMOUT.&SASMEM(DROP=TSF1-TSF&ENDSFF)
       ORPHAN.NOSPEC(DROP=SF1-SF&ENDSFF TSF1-TSF&ENDSFF);
  MERGE SPECIES(IN=IN2) TZFOUT(IN=IN1);
    BY EISSCC;
    ARRAY SF SF1-SF&ENDSFF;
    ARRAY TSF TSF1-TSF&ENDSFF;
*;
*---- IF EMISSIONS AND SPECIES PRESENT, MULTIPLY EMISSIONS AND OUTPUT.
*;
    IF IN1 AND IN2 THEN DO;
*;
%*;
%*---- REPEAT FOR EACH MAJCAT (IF FIRST MAJ_CAT THEN CONVERT TONS TO KG;
%*;
   %LET FIRST=%EVAL(1);
   %DO K=1 %TO &INDX2;
      %IF &K=1 %THEN %LET FACTOR=907.18;
      %ELSE %LET FACTOR=1;
      %LET LAST=%EVAL(&FIRST+&&NUM_SP&K.-1);
       DO  I =&FIRST TO &LAST;
         SF=TSF*&&MAJCAT&K*&FACTOR;
       END;
      %LET FIRST=%EVAL(&LAST+1);
   %END;
*;
      OUTPUT SMOUT.&SASMEM;
    END;
*;
*---- IF NO SPECIES ARE MERGED TO EMISSIONS RECORD, OUTPUT TO ORPHAN;
*;
    ELSE IF IN1 THEN DO; OUTPUT ORPHAN.NOSPEC; END;
*;
%MEND SORTMER;
*;
***** MACRO PSPMER

***** MERGE PSPLIT FILE WITH SFF IF SFF EXISTS ALSO PLACE CLASS
      SAROAD CODES INFO A FILE FOR THE REPORT.
;
%MACRO PSPMER;
  DATA SPECIES(KEEP=EISSCC TSF1-TSF&ENDSFF)
       CLASSES(KEEP=CLASS ORDER);
  %IF &SFF>=1 %THEN %DO;
    MERGE PSPLIT(IN=IN1) SFF;
    BY EISSCC;
    IF IN1;
  %END;
  %ELSE %DO;
    SET PSPLIT;
  %END;
  ARRAY SFCLASS CLASS1-CLASS&ENDSFF;
*;
*---- IF FIRST PASS, CREATE CLASS DATA;
*;
  IF _N_=1 THEN DO;
    ORDER=0;
    DO _I_=1 TO &ENDSFF;
      ORDER=_I_;
      CLASS=SFCLASS;
      OUTPUT CLASSES;
    END;
  END;
*;
*---- OUTPUT MERGED SPECIATION RECORDS;
*;
  OUTPUT SPECIES;
*;
%MEND PSPMER;
*;
***** MACRO SFFIN

***** READS THE PSPLIT OUTPUT FILE, THE SPECIATION FACTOR FILE,
      MERGES THE TWO AND CALLS THE EMISSION MERGE MACRO.
;
%MACRO SFFIN;
%*;
%*---- CALCULATE SPECIES COUNTERS;
%*;
  %LET PSPLIT=%EVAL(&PSPLIT);
  %LET NO=%EVAL(&PSPLIT-1);
  %LET NO2=%EVAL(&PSPLIT);
  %LET THCNUM=%EVAL(&PSPLIT-2);
*;
***** INPUT PSPLIT OUTPUT FILE;
```

```
*;
DATA PSPLIT(DROP=TYPE); INFILE PSPLIT;
  ARRAY CLASS CLASS1-CLASS&PSPLIT;
  ARRAY TSF TSF1-TSF&PSPLIT;
  RETAIN CLASS1-CLASS&PSPLIT;
*;
*    INPUT RECORD TYPE
;
  INPUT @94 TYPE 1. @1 @;
*;
*    TYPE 1 RECORD (HEADER)
;
  IF TYPE=1 THEN DO;
%*;
%*--- CHOICE OF LOOP IS DEPENDENT ON &THCNUM;
%*;
%IF &THCNUM <= 15 %THEN %DO;
    DO _I_=1 TO &THCNUM;
      INPUT CLASS 5. @;
    END;
    INPUT;
    INPUT;
 %END;
 %ELSE %DO;
    DO _I_=1 TO 15;
      INPUT CLASS 5. @;
    END;
    INPUT;
    DO _I_=16 TO &THCNUM;
      INPUT CLASS 5. @;
    END;
    INPUT;
 %END;
 %*;
 *;
 *---- NOX SPECIES;
 *;
    CLASS&NO=42601;
    CLASS&NO2=42602;
 *;
    OUTPUT;
    RETURN;
  END /* TYPE 1 */;
 *;
 *     TYPE 2 RECORD (SPECIATION FACTORS)
 ;
   IF TYPE=2 THEN DO;
     INPUT @1 STATE 2. @3 COUNTY 4. @7 PLANT_ID $4. @11 POINT_ID $3.
           @14 EISSCC 8. @;
 %*;
 %*--- CHOICE OF LOOP IS DEPENDENT ON &THCNUM;
 %*;
 %IF &THCNUM <= 15 %THEN %DO;
     DO _I_=1 TO &THCNUM;
       INPUT TSF 4.2 @;
     END;
     INPUT @82 HCHOWT 4.4 TSF&NO 4.3 TSF&NO2 4.3;
     INPUT;
 %END;
 %ELSE %DO;
     DO _I_=1 TO 15;
```

```
      INPUT TSF 4.2 @;
    END;
    INPUT HCHOWT 4.4 TSF&NO 4.3 TSF&NO2 4.3;
    INPUT @22 @;
    DO _I_=16 TO &THCNUM;
      INPUT TSF 4.2 @;
    END;
    INPUT;
%END;
%*;
    OUTPUT;
    RETURN;
  END;
*;
*     BAD PSPLIT RECORD
;
  PUT '*** FATAL: BAD PSPLIT RECORD' TYPE=;
  ABORT;
*;
***** SORT PSPLIT OUTPUT
;
PROC SORT DATA=PSPLIT; BY EISSCC;
%*;
%*---- READ THE SFF FILE IF PRESENT;
%*;
%*---- CALCULATE SPECIES COUNTERS;
%*;
  %IF &SFF=. %THEN %LET SFF=%EVAL(0);
  %LET BEGSFF=%EVAL(&PSPLIT+1);
  %LET ENDSFF=%EVAL(&PSPLIT+&SFF);
  %IF &SFF>=1 %THEN %DO;
%*;
  DATA SFF; INFILE SFF;
    ARRAY CLASS CLASS&BEGSFF-CLASS&ENDSFF;
    ARRAY TSF TSF&BEGSFF-TSF&ENDSFF;
    INPUT @1 EISSCC 8. @22 @;
          DO _I_=1 TO &SFDEX;
            INPUT CLASS 5. TSF 4.4 @;
          END;
*;
***** SORT SPECIATION FACTOR FILE
;
PROC SORT DATA=SFF; BY EISSCC;
*;
  %END;
*;
***** MERGE PSPLIT OUTPUT WITH SFF.
;
%PSPMER
*;
***** MERGE COMPLETE SPECIATION FACTORS WITH EMISSION FILE
;
DATA _NULL_;SET ONE;
%*;
%*---- CREATE MACRO VARIABLES FOR MAJOR POLLUTANT NAMES AND NUMBERS;
%*;
%DO K=1 %TO &INDX2;
  CALL SYMPUT("MAJCAT&K",MAJCAT&K);
  CALL SYMPUT("NUM SP&K",NUM SP&K);
%END;
  CALL SYMPUT('INDX2',INDX2);
  CALL SYMPUT('SASMEM',SASMEM);
  CALL SYMPUT('SCE',SCE);
  RUN;
*;
***** APPLY TIMEZONE DATA TO EMISSION FILE;
*;
  %TIMEZONE;
*;
***** APPLY SPECIATION FACTORS TO EMISSION FILE;
*;
  %SORTMER
*;
%MEND SFFIN;
*;
***** MACRO DETAIL

***** PRINT OUT DETAILED REPORT
;
%MACRO DETAIL;
%*;
%*---- PRODUCE SUMS IF REQUESTED;
%*;
%LET NUMSP=%EVAL(&NUMSP);
%IF &DETAIL=T %THEN %DO;
  PROC MEANS MAXDEC=0 SUM DATA=SMOUT.&SASMEM;
  VAR SF1-SF&NUMSP;
  TITLE 'ANNUAL TOTALS OF SPECIATED EMISSIONS';
%END;
*;
*---- PRINT RECORDS WITHOUT NO TIMEZONE DATA;
*;
PROC PRINT DATA=ORPHAN.NOTIME;
  VAR EISSCC STATE COUNTY;
  TITLE 'EMISSION RECORDS WITH NO TIME ZONE DATA';
*;
*;
*---- PRINT NOSPEC (NO MATCH IN SPECIATION FILE)
;
PROC PRINT DATA=ORPHAN.NOSPEC;
  VAR EISSCC STATE COUNTY;
TITLE 'EMISSION RECORDS WITH NO SPECIATION PROFILE';
FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
%*;
%*--- CHECK COF FOR DETAIL
;
  %IF &DETAIL=D %THEN %DO;
    PROC PRINT DATA=SMOUT.&SASMEM;
    ID EISSCC STATE COUNTY;
    VAR SF1-SF&NUMSP;
    FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
    TITLE 'APPLIED SPECIATION FACTORS';
  %END;
*;
%MEND DETAIL;
*;
*************************
* END MACRO DEFINITIONS *
*************************
;
********************
* MAIN PROGRAM: SM *
```

```
*******************

***** THIS PROGRAM WILL:
                1. READ THE CONTROL OPTIONS FILE
                2. READ THE PSPLIT OUTPUT FILE
                3. READ THE SFF FILE
                4. MERGE 2. AND 3.
                5. MERGE WITH EMISSION FILE
                6. MULTIPLY SPECIE FACTORS BY ANNUAL EMISSIONS
                7. PRODUCE A DIAGNOSTIC REPORT
;
*---- OPEN FILES AND DEFINE ARRAYS
;
DATA ONE(DROP=TYPE); INFILE COF EOF=WRITE;
  ARRAY MAJCAT $ 8 MAJCAT1-MAJCAT15;
  ARRAY NUM_SP NUM_SP1-NUM_SP15;
  RETAIN SCE DETAIL SASMEM MAJCAT1-MAJCAT15 NUM_SP1-NUM_SP15
        NUMSP RUN_ID INDX2;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION)
;
  IF TYPE=1 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 1 RECORDS.
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*     INPUT AND CHECK DATA
;
    INPUT @3 SCE $2. @6 DETAIL $1. @8 SASMEM $8. @17 RUN_ID $56.;
    IF SCE NE 'AS' THEN DO;
      PUT '*** FATAL: INVALID SOURCE TYPE ' SCE=;
      ABORT;
    END;
    IF DETAIL NE 'D' AND DETAIL NE 'S' AND DETAIL NE 'T' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT ' DETAIL=;
      ABORT;
    END;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (SPECIATION FILE FORMAT).
;
  IF TYPE=2 THEN DO;
*;
*     CHECK FOR TOO MANY TYPE 2 RECORDS
;
    INDX2+1;
    IF INDX2>15 THEN DO;
      PUT '*** FATAL: TOO MANY POLLUTANT CLASSES SPECIFIED';
      ABORT;
    END;
*;
*     INPUT AND CHECK DATA
;
     I =INDX2;
```

```
   INPUT @3 MAJCAT $8. @12 NUM_SP 2.;
*;
*---- ATHC MUST BE FIRST;
*;
   IF _I_=1 AND MAJCAT NE 'ATHC' THEN DO;
     PUT '*** FATAL: THC IS NOT FIRST CATEGORY IN CONTROL FILE';
     ABORT;
   END;
*;
*---- ANOX MUST BE SECOND;
*;
   IF _I_=2 AND MAJCAT NE 'ANOX' THEN DO;
     PUT '*** FATAL: NOX IS NOT SECOND CATEGORY IN CONTROL FILE';
     ABORT;
   END;
*;
   IF NUM_SP>30 THEN DO;
     PUT '*** FATAL: GREATER THAN 30 SUBCLASSES SPECIFIED';
     ABORT;
   END;
   NUMSP+NUM_SP;
   RETURN;
  END;
*;
*---- INVALID CONTROL RECORD
;
  PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
  ABORT;
*;
*---- BEFORE OUTPUT, CREATE COUNTERS FOR PSPLIT AND SFF FILES;
*;
WRITE: SFF=SUM(NUM_SP3-NUM_SP15);
       PSPLIT=SUM(NUM_SP1,NUM_SP2);
*;
*---- CHECK IF SPECIATION SPECIFIED;
*;
  IF NUMSP=. THEN DO;
    PUT '*** FATAL: NO SPECIATION REQUESTED IN CONTROL FILE';
    ABORT;
  END;
*;
      OUTPUT;
*;
***** INPUT SPECIATION FACTOR FILE
;
*---- CREATE MACRO VARIABLES AND CALL INPUT MACRO
;
      CALL SYMPUT('INDX2',INDX2);
      CALL SYMPUT('PSPLIT',PSPLIT);
      CALL SYMPUT('SFF',SFF);
      RUN;
      %SFFIN
*;
***** WRITE DIAGNOSTIC REPORT
;
*---- DEFINE FILE ASSIGN ARRAY AND INITIALIZE VARIABLES
;
DATA _NULL_;SET ONE;
  ARRAY MAJCAT $ 8 MAJCAT1-MAJCAT15;
  ARRAY NUM_SP NUM_SP1-NUM_SP15;
  FILE PRINT NOTITLES;
```

```
 IF DETAIL='S' THEN REPO=' SUMMARY';
   ELSE IF DETAIL='T' THEN REPO='   TOTALS';
   ELSE REPO='DETAILED';
 DT=DATE();TM=TIME();
 RUNCOL=66-LENGTH(RUN_ID)/2;
*;
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @110 'SPECIATION MODULE (SM)'//@2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*;
*---- PRINT TYPE 1 RECORD
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SCE ' DETAIL: '
      DETAIL ' SAS FILE: ' SASMEM 'RUN ID: ' RUN_ID///;
*;
*---- PRINT TYPE 2 RECORDS
;
IF INDX2>0 THEN DO;
  PUT @2 'POLLUTANT SPECIES DEFINITION RECORDS:'//
      @51 '             MAJOR      # OF'/
      @51 'RECORD #  POLLUTANT   SPECIES'/
      @51 '-----------------------------'/;
  DO _I_=1 TO INDX2;
    PUT @53 _I_ 2. @61 MAJCAT $8. @75 NUM_SP 2./;
  END;
  PUT @51 '-----------------------------'/_PAGE_;
END;
*;
*---- PRINT SF IDENTITY;
*;
DATA SAROAD;INFILE SAROAD;
  INPUT @1 CLASS 5. @7 LABEL $40.;
*;
PROC SORT DATA=SAROAD;BY CLASS;
PROC SORT DATA=CLASSES;BY CLASS;
*;
DATA MATCH;MERGE SAROAD CLASSES(IN=IN2);BY CLASS;
  IF IN2;
*;
PROC SORT DATA=MATCH;BY ORDER;
*;
DATA _NULL_;SET MATCH;FILE PRINT HEADER=H NOTITLES;
  PUT @40 ORDER 3. +4 CLASS 5. +4 LABEL $40.;
  RETURN;
*;
H:  PUT @37 '                          SPECIE DESCRIPTIONS'//
        @37 '   SF   POLLUTANT                         POLLUTANT'/
        @37 ' NUMBER   SAROAD                         DESCRIPTION'/
        @37 '-----------------------------------------------------------'/;
*;
*---- PROCESS DETAILED REPORT
;
DATA _NULL_;SET ONE;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('SASMEM',SASMEM);
CALL SYMPUT('NUMSP',NUMSP);
RUN;
```

```
%DETAIL
*;
********************
* END MAIN PROGRAM *
********************
;
```

APPENDIX D

SPATIAL ALLOCATION MODULE SOURCE CODE

```
OPTIONS NOSOURCE DQUOTE;
*-----------------------------------------------------------------------*

 APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

 PROGRAM: SPATIAL ALLOCATION MODULE (SAM) - POINT SOURCES

 LANGUAGE: SAS(VERSION 5.08)

 PURPOSE: ASSIGN A USER-DEFINED GRID MATRIX BASED ON LATITUDE
          AND LONGITUDE.

 VARIABLE LIST: CONTROL OPTIONS FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
TYPE          MAIN       CONTROL OPTION RECORD TYPE
DETAIL        MAIN       LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
SCE           MAIN       SOURCE TYPE TO PROCESS
SASMEM        MAIN       MEMBER NAME OF SAS LIBRARY (EISIN) TO PROCESS
RUN_ID        MAIN       RUN IDENTIFICATION HEADER
NLAT          MAIN       NORTHERNMOST LATITUDE OF GRID
SLAT          MAIN       SOUTHERNMOST LATITUDE OF GRID
ILAT          MAIN       NUMBER OF GRIDS PER DEGREE LATITUDE
WLON          MAIN       WESTERNMOST LONGITUDE OF GRID
ELON          MAIN       EASTERNMOST LONGITUDE OF GRID
ILON          MAIN       NUMBER OF GRIDS PER DEGREE LONGITUDE

 VARIABLE LIST: ADDITIONS TO EMISSION RECORDS

NAME         ROUTINE              DESCRIPTION
========================================================================
LAT           LOCATE     FRACTIONAL LATITUDE
LON           LOCATE     FRACTIONAL LONGITUDE
ROW           LOCATE     GRID ROW
COL           LOCATE     GRID COLUMN

 VARIABLE LIST: GENERAL

NAME         ROUTINE              DESCRIPTION
========================================================================
GRID_ROW      MAIN       NUMBER OF ROWS IN GRID
GRID_COL      MAIN       NUMBER OF COLUMNS IN GRID
GRID_TOT      MAIN       TOTAL NUMBER OF CELLS IN GRID
LAT_DEG       LOCATE     DEGREES LATITUDE
LON_DEG       LOCATE     DEGREES LONGITUDE
LAT_MIN       LOCATE     MINUTES LATITUDE
LON_MIN       LOCATE     MINUTES LONGITUDE
LAT_SEC       LOCATE     SECONDS LATITUDE
LON_SEC       LOCATE     SECONDS LONGITUDE
UTM_ZONE      LOCATE     UTM ZONE
UTMX          LOCATE     UTM HORIZONTAL COORDINATE
UTMY          LOCATE     UTM VERTICAL COORDINATE
LATX          LOCATE     TEMPORARY VARIABLE
LONX          LOCATE     TEMPORARY VARIABLE
UTMYX         LOCATE     TEMPORARY VARIABLE
LONY          LOCATE     TEMPORARY VARIABLE

  ERROR HANDLING:  INPUT DATA FROM CONTROL FILE IS CHECKED FOR
                   VALIDITY. EACH EMISSION RECORD IS CHECKED FOR
```

```
               INCLUSION INSIDE THE GRID.

  CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

  METHOD:  SAM INPUTS THE CONTROL OPTIONS FILE AND CHECKS THE DATA FOR
           VALIDITY. ROW AND COLUMNS ARE CALCULATED USING POLAR OR UTM
           COORDINATES.

  PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, JULY 1985

*----------------------------------------------------------------------*

****************************
* MACRO DEFINITION SECTION *
****************************

***** MACRO LOCATE

***** MERGE COF WITH EISIN, AND CALCULATE
      LOCATIONS FOR POINT SOURCES.
;
%MACRO LOCATE;
%*;
%*--- MERGE COF AND EMISSION FILE
;
  DATA OUTFILE1.&SASMEM(DROP=LAT_DEG LAT_MIN LAT_SEC LON_DEG LON_MIN
       LON_SEC UTM_ZONE UTMX UTMY)
       OUTFILE2.NOLOC
       OUTFILE2.OUTSIDE;
       IF _N_=1 THEN SET ONE;
       SET INFILE.&SASMEM;
       DROP RUN_ID SCE DETAIL SASMEM SLAT NLAT ILAT WLON GRID_ROW
         GRID_COL GRID_TOT ELON ILON LATX LONX UTMYX LONY;
*;
*---- CALCULATE ROW AND COL FROM LAT AND LON
;
    LAT=LAT_DEG+(LAT_MIN/60)+(LAT_SEC/3600);
    LON=LON_DEG+(LON_MIN/60)+(LON_SEC/3600);
    COL=INT((WLON-LON)*ILON)+1;
    ROW=INT((LAT-SLAT)*ILAT)+1;
*;
*---- IF MISSING CALCULATE ROW AND COL USING UTMS
;
    IF ROW=. OR COL=. THEN DO;
      LATX=UTMY/111;
      LONX=(UTMX-500)/((111.226+0.0053*LATX)*(COS(0.017453*LATX)));
      UTMYX=UTMY-(3187*SIN(2*0.017453*LATX)*(1-COS(0.017453*LONX)));
      LAT=(UTMYX-2.41-0.00903*LATX*LATX)/110.270;
      LONY=(UTMX-500)/((111.226+0.0053*LAT)*(COS(0.017453*LAT)));
      LON=180-(6*UTM_ZONE)+3-LONY;
      COL=INT((WLON-LON)*ILON)+1;
      ROW=INT((LAT-SLAT)*ILAT)+1;
*;
*---- IF STILL MISSING, OUTPUT TO ERROR FILE
;
      IF ROW=. OR COL=. THEN DO;
        OUTPUT OUTFILE2.NOLOC;
        RETURN;
      END;
    END;
*;
```

```
*---- IF OUTSIDE OF GRID, OUTPUT TO OUTLIER FILE
;
    IF ROW<1 OR ROW>GRID_ROW OR COL<1 OR COL>GRID_COL THEN DO;
      OUTPUT OUTFILE2.OUTSIDE;
      RETURN;
    END;
*;
*---- IF PROCESSING REACHES HERE, OUTPUT TO SPATIALLY ALLOCATED FILE
;
    SAF=1;
    OUTPUT OUTFILE1.&SASMEM;
    RETURN;
*;
%*;
%*--- END OF MACRO LOCATE
;
%MEND LOCATE;
*;
***** MACRO REPORT

***** GENERATE REPORTS FOR A VARIETY OF CONDITIONS
;
%MACRO REPORT;
%*;
%*---- COMPLETE SUMMARY REPORT
;
   PROC PRINT DATA=OUTFILE2.NOLOC;
   VAR EISSCC STATE COUNTY PLANT_ID POINT_ID;
   FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
   TITLE 'POINT SOURCE EMISSION RECORDS CONTAINING NO LOCATION DATA';
   PROC PRINT DATA=OUTFILE2.OUTSIDE;
   VAR EISSCC STATE COUNTY PLANT_ID POINT_ID LAT LON COL ROW;
   FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
   TITLE 'POINT SOURCES OUTSIDE OF GRID BOUNDRIES';
%*;
%*---- DETAILED REPORT
;
%IF &DETAIL=D %THEN %DO;
  PROC PRINT DATA=OUTFILE1.&SASMEM;
  ID EISSCC STATE COUNTY;
  VAR PLANT_ID POINT_ID LAT LON COL ROW;
  TITLE 'GRID LOCATIONS OF EMISSION RECORDS';
  FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
%END;
%*;
%MEND REPORT;
*;
****************************
* END OF MACRO DEFINITIONS *
****************************

*********************
* MAIN PROGRAM: SAM *
*********************

***** THIS PROGRAM WILL:

                 1. READ AND VALIDATE CONTROL OPTIONS FILE (COF)
                 2. MERGE COF WITH EMISSION FILE
                 3. PRODUCE A DIAGNOSTIC REPORT
;
```

```
***** READ CONTROL FILE
;
*---- OPEN FILE AND INPUT RECORD TYPE
;
DATA ONE(DROP=TYPE INDX1 INDX2);INFILE COF EOF=WRITE;
  RETAIN SCE DETAIL SASMEM RUN_ID NLAT SLAT ILAT WLON ELON ILON
         GRID_ROW GRID_COL GRID_TOT;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION)
;
  IF TYPE=1 THEN DO;
*;
*---- CHECK FOR TOO MANY TYPE 1 RECORDS
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*---- INPUT AND CHECK DATA
;
    INPUT @3 SCE $2. @6 DETAIL $1. @8 SASMEM $8. @17 RUN_ID $56.;
    IF DETAIL NE 'D' AND DETAIL NE 'S' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT' DETAIL=;
      ABORT;
    END;
    IF SCE NE 'PS' THEN DO;
      PUT '*** FATAL: INVALID EIS FILE TYPE ' SCE=;
      ABORT;
    END;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (GRID DEFINITION)
;
  IF TYPE=2 THEN DO;
*;
*---- CHECK FOR TOO MANY TYPE 2 RECORDS
;
    INDX2+1;
    IF INDX2>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 2 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*---- INPUT AND CHECK DATA
;
    INPUT @3 SLAT 2. @6 NLAT 2. @9 ILAT 2. @12 WLON 3. @16 ELON 3.
          @20 ILON 2.;
    GRID_ROW=(NLAT-SLAT)*ILAT;
    GRID_COL=(WLON-ELON)*ILON;
    GRID_TOT=GRID_ROW*GRID_COL;
    RETURN;
  END;
*;
*---- INVALID CONTROL RECORD
;
  PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
  ABORT;
```

```
*;
WRITE: OUTPUT;
*;
***** CALL MERGE MACRO
;
CALL SYMPUT('SASMEM',SASMEM);
RUN;
%LOCATE
*;
***** WRITE DIAGNOSTIC REPORT
;
*---- ECHO CONTROL FILE
;
DATA _NULL_;SET ONE;
  FILE PRINT NOTITLES;
  IF DETAIL='S' THEN REPO=' SUMMARY';ELSE REPO='DETAILED';
  DT=DATE(); TM=TIME();
  RUNCOL=66-LENGTH(RUN_ID)/2;
*;
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @101 'SPATIAL ALLOCATION MODULE (SAM)'//
      @2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*
*---- COF TYPE 1 RECORD (RUN IDENTIFICATION)
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SCE ' DETAIL: '
      DETAIL ' SAS FILE: ' SASMEM ' RUN ID: ' RUN_ID///;
*
*---- COF TYPE 2 RECORD (GRID SPECIFICATION)
;
  PUT @2 'GRID DEFINITION RECORD:'//@25 'NORTH LATITUDE: ' NLAT 2.
      @89 'WEST LONGITUDE: ' WLON 3./@25 'SOUTH LATITUDE: ' SLAT 2.
      @89 'EAST LONGITUDE: ' ELON 3.//@51 ' GRIDS PER DEGREE LATITUDE: '
      ILAT 2./@51 'GRIDS PER DEGREE LONGITUDE: ' ILON 2./@63
      'NUMBER OF ROWS: ' GRID_ROW 7./@60 'NUMBER OF COLUMNS: '
      GRID_COL 7./@62 'NUMBER OF GRIDS: ' GRID_TOT 7./_PAGE_;
*
*---- PRINT ERROR FILES AND EMISSION FILE IF REQUESTED
;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('SASMEM',SASMEM);
RUN;
%REPORT
*;
***********************
* END OF MAIN PROGRAM *
***********************
;
```

```
*OPTIONS NOSOURCE DQUOTE;
*----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: SPATIAL ALLOCATION MODULE (SAM) - AREA SOURCES

  LANGUAGE: SAS(VERSION 5.08)

  PURPOSE: FOR AREA SOURCES, TO APPLY SPATIAL ALLOCATION DATA TO
           COUNTIES EMISSIONS.

  VARIABLE LIST: CONTROL OPTIONS FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
TYPE          MAIN      CONTROL OPTION RECORD TYPE
DETAIL        MAIN      LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
SCE           MAIN      SOURCE TYPE TO PROCESS
SASMEM        MAIN      MEMBER NAME OF SAS LIBRARY (EISIN) TO PROCESS
RUN_ID        MAIN      RUN IDENTIFICATION HEADER
NLAT          MAIN      NORTHERNMOST LATITUDE OF GRID
SLAT          MAIN      SOUTHERNMOST LATITUDE OF GRID
ILAT          MAIN      NUMBER OF GRIDS PER DEGREE LATITUDE
WLON          MAIN      WESTERNMOST LONGITUDE OF GRID
ELON          MAIN      EASTERNMOST LONGITUDE OF GRID
ILON          MAIN      NUMBER OF GRIDS PER DEGREE LONGITUDE

  VARIABLE LIST: ADDITIONS TO EMISSION RECORDS

NAME         ROUTINE              DESCRIPTION
========================================================================
ROW           ALLOCATE  GRID ROW
COL           ALLOCATE  GRID COLUMN
SAF           ALLOCATE  SPATIAL ALLOCATION FACTOR

  VARIABLE LIST: SPATIAL ALLOCATION FACTOR FILE

NAME         ROUTINE              DESCRIPTION
========================================================================
NEDSID        ALLOCATE  STATE AND COUNTY CODE
NCOL1-NCOL160 ALLOCATE  GRID COLUMN
NROW1-NROW160 ALLOCATE  GRID ROW
NSAF1-NSAF160 ALLOCATE  SPATIAL ALLOCATION FACTOR
NGRID         ALLOCATE  NUMBER OF GRIDS IN COUNTY
EISSCC        ALLOCATE  AREA SOURCE CATEGORY NUMBER (PSEUDO SCC)

  VARIABLE LIST: GENERAL

NAME         ROUTINE              DESCRIPTION
========================================================================
STATE         ALLOCATE  STATE CODE
COUNTY        ALLOCATE  COUNTY CODE
IN1           ALLOCATE  EMISSION FILE MERGE FLAG
IN2           ALLOCATE  SPATIAL ALLOCATION FACTOR FILE MERGE FLAG
_I_           ALLOCATE  ARRAY INDEX
GRID_ROW      MAIN      NUMBER OF ROWS IN GRID
GRID_COL      MAIN      NUMBER OF COLUMNS IN GRID
GRID_TOT      MAIN      TOTAL NUMBER OF CELLS IN GRID
```

```
ERROR HANDLING:  INPUT DATA FROM CONTROL FILE IS CHECKED FOR
                 VALIDITY. EACH EMISSION RECORD IS CHECKED FOR
                 INCLUSION INSIDE THE GRID.

CALLED BY: USER SPECIFIED RUNSTREAM (JCL)

METHOD:  SAM INPUTS THE CONTROL OPTIONS FILE AND CHECKS THE DATA FOR
         VALIDITY.  IF THE EMISSION FILE IS AREA SOURCES, THE DATA
         ARE MERGED WITH THE SPATIAL ALLOCATION FACTOR FILE AND MULTIP

PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, JULY 1985

UPDATED: DON NEAL, JULY 1986
                                                                     
*---------------------------------------------------------------------*

****************************
* MACRO DEFINITION SECTION *
****************************

***** MACRO ALLOCATE

***** READ SPATIAL ALLOCATION FACTOR FILE, MERGE WITH EMISSION FILE, AND
      MULTIPLY EMISSIONS BY FACTORS.
;
%MACRO ALLOCATE;
%*;
***** INPUT SPATIAL ALLOCATION FILE
;
  DATA SAFFIN.SASSAFF(DROP=NCOL1-NCOL160 NROW1-NROW160
    NSAF1-NSAF160 NGRID RECORD);
  INFILE SAFF;
    ARRAY NCOL NCOL1-NCOL160;
    ARRAY NROW NROW1-NROW160;
    ARRAY NSAF NSAF1-NSAF160;
    INPUT @1 STATE 2. @3 COUNTY 4. EISSCC 3. NGRID 3. @;
    DO _I_=1 TO NGRID;
      INPUT NCOL 4. NROW 4. NSAF 4.4 @;
      COL=NCOL;
      ROW=NROW;
      SAF=NSAF;
      RECORD+1;
      IF RECORD>=&FIRST AND RECORD<=&LAST THEN OUTPUT;
      IF RECORD>=&LAST THEN STOP;
    END;
*;
***** SORT SPATIAL FILE TO PREP FOR MERGE
;
  PROC SORT DATA=SAFFIN.SASSAFF OUT=SAFFOUT.SASSAFF;
    BY EISSCC STATE COUNTY;
*;
***** MERGE EMISSION FILE WITH SPATIAL FILE
;
  DATA SAMOUT.&SASMEM(DROP=SAF &LIST)
       SAF(KEEP=EISSCC STATE COUNTY COL ROW SAF);
  MERGE SAFFOUT.SASSAFF(IN=IN2) SAMIN.&SASMEM(IN=IN1);
    BY EISSCC STATE COUNTY;
    ARRAY POLL &LIST;
    ARRAY POLLS &LISTS;
*;
*---- COMPLETE EMISSION RECORD IF IN1 AND IN2. MULTIPLY SAF BY
```

```
     EMISSIONS;
*;
  IF IN1 AND IN2 THEN DO;
    DO OVER POLL;
      POLLS=POLL*SAF;
    END;
    OUTPUT SAMOUT.&SASMEM;
  END;
*;
*---- SPATIAL DATA WITHOUT EMISSION DATA
;
  ELSE DO;IF IN2 AND FIRST.COUNTY THEN OUTPUT SAF;END;
*;
%*;
%*--- END OF MACRO ALLOCATE
;
%MEND ALLOCATE;
*;
***** MACRO REPORT

***** GENERATE REPORTS FOR A VARIETY OF CONDITIONS
;
%MACRO REPORT;
%*;
%*---- GENERATE EMISSION SUMS IF REQUESTED;
%*;
%IF &DETAIL=T %THEN %DO;
  PROC MEANS MAXDEC=4 SUM DATA=SAMOUT.&SASMEM;
  VAR &LISTS;
  TITLE 'SPATIALLY ALLOCATED EMISSIONS';
%END;
%*;
%*---- COMPLETE SUMMARY REPORT
;
    PROC PRINT DATA=SAF;
    VAR STATE COUNTY EISSCC;
    TITLE 'SPATIAL ALLOCATION FACTORS WITH NO MATCHING EMISSION RECORDS';
    FORMAT STATE Z2. COUNTY Z4. EISSCC Z8.;
%*;
%*---- DETAILED REPORT
;
%IF &DETAIL=D %THEN %DO;
  PROC PRINT DATA=SAMOUT.&SASMEM;
  ID EISSCC STATE COUNTY;
  VAR COL ROW;
  TITLE 'GRID LOCATIONS OF EMISSION RECORDS';
  FORMAT EISSCC Z8. STATE Z2. COUNTY Z4.;
%END;
%*;
%MEND REPORT;
*;
****************************
* END OF MACRO DEFINITIONS *
****************************

*********************
* MAIN PROGRAM: SAM *
*********************

***** THIS PROGRAM WILL:
```

```
                  1. READ AND VALIDATE CONTROL OPTIONS FILE (COF)
                  2. MERGE COF WITH EMISSION FILE
                  3. PROCESS DATA ACCORDING TO SOURCE TYPE
                  4. PRODUCE A DIAGNOSTIC REPORT
;
***** READ CONTROL FILE
;
*---- OPEN FILE AND INPUT RECORD TYPE
;
DATA ONE(DROP=TYPE INDX1-INDX4);INFILE COF EOF=WRITE;
  RETAIN SCE DETAIL SASMEM RUN_ID NLAT SLAT ILAT WLON ELON ILON
         GRID_ROW GRID_COL GRID_TOT FIRST LAST LIST LISTS;
  INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 CONTROL RECORD (RUN IDENTIFICATION)
;
  IF TYPE=1 THEN DO;
*;
*---- CHECK FOR TOO MANY TYPE 1 RECORDS
;
    INDX1+1;
    IF INDX1>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 1 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*---- INPUT AND CHECK DATA
;
    INPUT @3 SCE $2. @6 DETAIL $1. @8 SASMEM $8. @17 RUN_ID $56.;
    IF DETAIL NE 'D' AND DETAIL NE 'S' AND DETAIL NE 'T' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT' DETAIL=;
      ABORT;
    END;
    IF SCE NE 'AS' THEN DO;
      PUT '*** FATAL: INVALID EIS FILE TYPE ' SCE=;
      ABORT;
    END;
    RETURN;
  END;
*;
*---- TYPE 2 CONTROL RECORD (GRID DEFINITION)
;
  IF TYPE=2 THEN DO;
*;
*---- CHECK FOR TOO MANY TYPE 2 RECORDS
;
    INDX2+1;
    IF INDX2>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 2 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*---- INPUT AND CHECK DATA
;
    INPUT @3 SLAT 2. @6 NLAT 2. @9 ILAT 2. @12 WLON 3. @16 ELON 3.
          @20 ILON 2.;
    GRID_ROW=(NLAT-SLAT)*ILAT;
    GRID_COL=(WLON-ELON)*ILON;
    GRID_TOT=GRID_ROW*GRID_COL;
    RETURN;
  END;
```

```
*;
*---- TYPE 3 CONTROL RECORD (SUBFILE DEFINITION);
*;
  IF TYPE=3 THEN DO;
*;
*---- CHECK FOR TOO MANY TYPE 3 RECORDS;
*;
    INDX3+1;
    IF INDX3>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 3 RECORD IN CONTROL FILE';
      ABORT;
    END;
*;
*---- INPUT AND CHECK DATA;
*;
    INPUT @3 FIRST LAST;
    NUMBER=LAST-FIRST;
    IF NUMBER>1000000 THEN DO;
      PUT '*** FATAL: NUMBER OF SUBFILE RECORDS EXCEEDS 1,000,000';
      ABORT;
    END;
    RETURN;
*;
  END /* TYPE 3 */;
*;
*---- TYPE 4 CONTROL RECORD (POLLUTANT LIST);
*;
  IF TYPE=4 THEN DO;
*;
*---  CHECK FOR TOO MANY TYPE 4 RECORDS;
*;
    INDX4+1;
    IF INDX4>1 THEN DO;
      PUT '*** FATAL: MORE THAN ONE TYPE 4 RECORD';
      ABORT;
    END;
*;
*---- INPUT DATA;
*;
    INPUT @3 LIST $70./@3 LISTS $70.;
    RETURN;
*;
  END /* TYPE 4 */;
*;
*---- INVALID CONTROL RECORD
;
  PUT '*** FATAL: INVALID CONTROL RECORD ' TYPE=;
  ABORT;
*;
WRITE: OUTPUT;
*;
***** CALL MERGE MACRO
;
CALL SYMPUT('SASMEM',SASMEM);
CALL SYMPUT('FIRST',FIRST);
CALL SYMPUT('LAST',LAST);
CALL SYMPUT('LIST',LIST);
CALL SYMPUT('LISTS',LISTS);
RUN;
%ALLOCATE
```

```
*;
***** WRITE DIAGNOSTIC REPORT
;
*---- ECHO CONTROL FILE
;
DATA _NULL_;SET ONE;
  FILE PRINT NOTITLES;
  IF DETAIL='S' OR DETAIL='T' THEN REPO=' SUMMARY';ELSE REPO='DETAILED';
  DT=DATE( ); TM=TIME( );
  RUNCOL=66-LENGTH(RUN_ID)/2;
*;
*---- PRINT HEADER
;
  PUT @2 'DATE: ' @8 DT DATE7. @21 'TIME: ' @27 TM TIME8.//
      @2 'FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)'
      @101 'SPATIAL ALLOCATION MODULE (SAM)'//
      @2 'DIAGNOSTIC REPORT'
      @RUNCOL RUN_ID @116 REPO @125 'LISTING'//@2 53*'-' @56
      'CONTROL FILE LISTING' @77 55*'-'//;
*
*---- COF TYPE 1 RECORD (RUN IDENTIFICATION)
;
  PUT @2 'RUN IDENTIFICATION RECORD:'//@7 'SOURCE: ' SCE ' DETAIL: '
      DETAIL ' SAS FILE: ' SASMEM ' RUN ID: ' RUN_ID///;
*
*---- COF TYPE 2 RECORD (GRID SPECIFICATION)
;
  PUT @2 'GRID DEFINITION RECORD:'//@25 'NORTH LATITUDE: ' NLAT 2.
      @89 'WEST LONGITUDE: ' WLON 3./@25 'SOUTH LATITUDE: ' SLAT 2.
      @89 'EAST LONGITUDE: ' ELON 3.//@51 ' GRIDS PER DEGREE LATITUDE: '
      ILAT 2./@51 'GRIDS PER DEGREE LONGITUDE: ' ILON 2./@63
      'NUMBER OF ROWS: ' GRID_ROW 7./@60 'NUMBER OF COLUMNS: '
      GRID_COL 7./@62 'NUMBER OF GRIDS: ' GRID_TOT 7.//;
*;
*---- COF TYPE 3 RECORD (SUBFILE DEFINITION);
*;
    NUMBER=LAST-FIRST+1;
    PUT @2 'SUBFILE DEFINITION RECORD:'//
        @7 ' LAST RECORD: ' LAST 11./
        @7 'FIRST RECORD: ' FIRST 11./
        @6 '----------------------------'/
        @7 'TOTAL RECORDS:' NUMBER 11. ///;
*;
*---- COF TYPE 4 RECORD (POLLUTANT LIST);
*;
    PUT @2 'POLLUTANT DEFINITION RECORD'//
        @7 'VARIABLE LIST: ' LIST $70. /
        @22 LISTS $70.///;
*;
*;
*---- PRINT ERROR FILES AND EMISSION FILE IF REQUESTED
;
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('SASMEM',SASMEM);
CALL SYMPUT('LISTS',LISTS);
RUN;
%REPORT
*;
***********************
* END OF MAIN PROGRAM *
***********************
```

APPENDIX E

MODEL INPUT PREPROCESSOR SOURCE CODE

```
OPTIONS MPRINT;
*----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM: MODEL INPUT PREPROCESSOR - POINT AND AREA SOURCES

  LANGUAGE: SAS (VERSION 5.08)

  PURPOSE: FOR AREA SOURCES, TO COMBINE EMISSIONS SUBFILES
           BY (COLUMN,ROW) OR (SCC,STATE,COUNTY) AND GREENWICH MEAN TIME
           FOR POINT SOURCES, TO CONCATENATE EMISSIONS SUBFILES AND
           SORT BY COLUMN AND ROW.

  VARIABLE LIST: CONTROL OPTIONS FILE

NAME         ROUTINE                   DESCRIPTION
=======================================================================
TYPE           MAIN       CONTROL OPTIONS RECORD TYPE
SOURCE         MAIN       SOURCE TYPE OF EMISSION FILE
DETAIL         MAIN       LEVEL OF DETAIL FOR DIAGNOSTIC REPORT
INNUM          MAIN       NUMBER OF INPUT SUBFILES TO COMBINE
RUN_ID         MAIN       RUN IDENTIFICATION HEADER
VARLIST        MAIN       POLLUTANT VARIABLE LIST (AREA SOURCES ONLY)
EMRES          MAIN       EMISSIONS RESOLUTION (AREA SOURCES ONLY)

  VARIABLE LIST: GENERAL

NAME         ROUTINE                   DESCRIPTION
=======================================================================
COL      POINT,COMBINE    GRID COLUMN
ROW      POINT,COMBINE    GRID ROW
GMT         COMBINE       GREENWICH MEAN TIME
EISSCC      COMBINE       SOURCE CLASSIFICATION CODE
STATE       COMBINE       STATE CODE
COUNTY      COMBINE       COUNTY CODE

   ERROR HANDLING:
      ERRORS IN THE CONTROL FILE WILL HALT EXECUTION.



   METHOD: MIP INPUTS AND CHECKS THE CONTROL OPTIONS FILE.
           DEPENDING ON SOURCE TYPE, SUBFILES ARE COMBINED
           OR CONCATENATED AND SORTED.

  PROGRAMMER: DON NEAL, ALLIANCE TECHNOLOGIES CORPORATION, SEPTEMBER 1985
   UPDATED:    DON NEAL JULY 1986
               ANDREW ACKERMAN, ALLIANCE TECH CORP, JUNE 1987


*----------------------------------------------------------------------*
*;
***** FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

***** MODEL INPUT PREPROCESSOR

***** MIP WILL COMBINE AREA SOURCE SUBFILES OUTPUT FROM MTPREP
      BY (COL,ROW) OR (EISSCC,STATE,COUNTY) GMT.  FOR POINT SOURCES,
      CONCATENATE AND SORT BY COLUMN AND ROW.
```

```
*;
***** MACRO COMBINE

***** COMBINE MERGES AREA SOURCE SUBFILES AND SUMS BY
      (COL,ROW) OR (EISSCC,STATE,COUNTY) AND GMT.
*;
%MACRO COMBINE;
*;
%LET EMRES=%SUBSTR(&EMRES,1,1);
DATA MIPIN.DATA; SET
%*;
%*---- GENERATE SET STATEMENT;
%*;
%DO I=1 %TO &INNUM;
  IN&I..DATA
%END;
            ;
%*;
  %IF &EMRES=G %THEN
    %LET EMBY=%STR( COL ROW);
  %ELSE
    %LET EMBY=%STR( EISSCC STATE COUNTY);
*;
  BY &EMBY GMT;
*;
***** SUM IDENTICAL GRIDS AND HOURS;
*;
PROC MEANS NOPRINT SUM DATA=MIPIN.DATA;
  BY &EMBY GMT;
  VAR &VARLIST;
  OUTPUT OUT=MIPOUT.DATA SUM=&VARLIST;
*;
%MEND COMBINE;
*;
***** MACRO POINT

***** MACRO TO CONCATENATE POINT SOURCE FILES AND SORT BY
      COL ROW.
*;
%MACRO POINT;
*;
***** CONCATENATE SUBFILES;
*;
DATA MIPIN.DATA;RETAIN COL ROW;SET
%*;
%*---- GENERATE SET STATEMENT;
%*;
%DO I=1 %TO &INNUM;
  IN&I..DATA
%END;
            ;
*;
***** SORT MIPIN AND STORE IN MIPOUT;
*;
PROC SORT DATA=MIPIN.DATA OUT=MIPOUT.DATA;
  BY COL ROW;
*;
%MEND POINT;
*;
***** MACRO DETAIL
```

```
***** MACRO WILL GENERATE HOURLY SUMS FOR AREA SOURCES;

%MACRO DETAIL;
*;
***** SORT MIPOUT AND STORE AS BACKUP DATASET;
*;
PROC SORT DATA=MIPOUT.DATA OUT=MIPBACK.DATA;
  BY GMT;
*;
***** EXECUTE MEANS BY HOUR;
*;
PROC MEANS SUM NOPRINT DATA=MIPBACK.DATA;
  BY GMT;
  VAR &VARLIST;
  OUTPUT OUT=MEANS SUM=&VARLIST;
*;
PROC PRINT DATA=MEANS;
  TITLE 'HOURLY EMISSIONS';
  ID GMT;
*;
%MEND DETAIL;
*;
***** MACRO CHOOSE

***** MACRO TO CONTROL PROGRAM EXECUTION;

%MACRO CHOOSE;
%IF &SOURCE=AS %THEN %DO;
  %COMBINE;
%*;
  %IF &DETAIL=T %THEN %DO;
    %DETAIL;
  %END;
%END;
%ELSE %DO;
  %POINT;
%END;
%*;
%MEND CHOOSE;
*;
***** MAIN PROGRAM;

***** THIS PROGRAM WILL:
             1. READ AND VALIDATE THE COF.
             2. CALL THE PROPER MACROS FOR PROCESSING
*;
DATA ONE;INFILE COF EOF=WRITE;
*;
RETAIN;
   INPUT @1 TYPE 1. @;
*;
*---- TYPE 1 RECORD (RUN IDENTIFICATION);
*;
IF TYPE=1 THEN DO;
  INPUT @3 INNUM 1. @5 DETAIL $1. @7 SOURCE $2. @10 RUN_ID $62.;
*;
*---- CHECK INPUT;
*;
  IF DETAIL NE 'T' AND DETAIL NE 'S' THEN DO;
    PUT '*** FATAL: INVALID OPTION FOR DIAGNOSTIC REPORT';
    ABORT;
  END;
  IF SOURCE NE 'PS' AND SOURCE NE 'AS' THEN DO;
    PUT '*** FATAL: INVALID SOURCE FILE SPECIFICATION';
    ABORT;
  END;
  RETURN;
END;
*;
*---- TYPE 2 CONTROL RECORD (POLLUTANT VARIABLE LIST);
*;
IF TYPE=2 THEN DO;
  IF SOURCE NE 'AS' THEN DO;
    PUT '*** FATAL: INVALID RECORD FOR SOURCE TYPE';
    ABORT;
  END;
  INPUT @3 VARLIST $70.;
  RETURN;
END;
*;
*---- TYPE 3 CONTROL RECORD (EMISSIONS RESOLUTION);
*;
  IF TYPE=3 THEN DO;
    IF SOURCE NE 'AS' THEN DO;
      PUT '*** FATAL: INVALID RECORD FOR SOURCE TYPE';
      ABORT;
    END;
    INPUT @3 EMRES $10.;
    IF EMRES NE 'GRIDDED' AND EMRES NE 'NONGRIDDED' THEN DO;
      PUT '*** FATAL: INVALID OPTION FOR EMISSIONS RESOLUTION' EMRES=;
      ABORT;
    END;
*;
    RETURN;
  END;
*;
*---- INVALID CONTROL RECORD;
*;
PUT '*** FATAL: INVALID CONTROL RECORD TYPE';
ABORT;
*;
WRITE:OUTPUT;
*;
*---- CREATE MACRO VARIABLES AND CALL CHOOSE MACRO;
*;
CALL SYMPUT('SOURCE',SOURCE);
CALL SYMPUT('DETAIL',DETAIL);
CALL SYMPUT('INNUM',INNUM);
CALL SYMPUT('VARLIST',VARLIST);
CALL SYMPUT('EMRES',EMRES);
*;
RUN;
*;
%CHOOSE;
```

```
OPTIONS MPRINT MISSING=' ';
*----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM:  POINT SOURCE SAS TO EBCDIC MODELER'S TAPE CONVERSION

  LANGUAGE:  SAS (VERSION 5.16)

  PURPOSE:  TO PRODUCE POINT SOURCE EBCDIC MODELER'S TAPE FROM
            SAS DATA SET

  COF VARIABLE LIST

NAME                            DESCRIPTION
========================================================================
VERSION                 VERSION OF EMISSIONS INVENTORY (5.2 OR 5.3)
NUMSPF                  NUMBER OF POLLUTANT SPECIES FACTORS


  ERROR HANDLING:  INVALID VALUES IN CONTROL OPTIONS FILE WILL
                   HALT EXECUTION.

  METHOD:  READS AND CHECKS CONTROL OPTIONS FILE.  WRITES EMISSIONS.

  PROGRAMMER:  ANDREW ACKERMAN, ALLIANCE TECH CORP, JUNE 1987

*----------------------------------------------------------------------*

***** MACRO DEFINITION *****;

***** MACRO WRITE

***** WRITE SAS EMISSIONS DATA INTO EBCDIC FILE
;
%MACRO WRITE;
%LET NUMSPF = %EVAL(&NUMSPF);
*;
DATA _NULL_;SET INFILE.DATA;
ARRAY SAROAD SAROAD1-SAROAD15;
ARRAY EMISS EMISS1-EMISS15;
ARRAY SEA SEA1-SEA12;
ARRAY DAY DAY1-DAY12;
ARRAY HOUR (NUMHRS) HOUR1-HOUR288;
ARRAY CAT CAT1-CAT&NUMSPF;
ARRAY CLASS CLASS1-CLASS&NUMSPF;
ARRAY CONEFF CONEFF1-CONEFF15;
ARRAY SF SF1-SF&NUMSPF;
ARRAY ESTMET ESTMET1-ESTMET15;
  FILE FILE1;
    PUT @1 EISSCC Z8. STATE Z2. COUNTY Z4. PLANT_ID $4. POINT_ID $2.
        AQCR Z4. EISSIC 4. SOURCE $2. LAT 10.6 LON 10.6 COL 4.
        ROW 4. ZONE 1. DAYLITE 1. FLOW 7. PLUME_HT 4. STACK_DI 4.1
        STACK_HT 4. STACK_TP 4. VELOCITY 5. HCHOWT 5.4 REC_DATE 2.
        NUMPOLL 2. @;
        DO  I =1 TO NUMPOLL;
          PUT SAROAD 5. EMISS 7. @;
        END;
    PUT NUM_DAY 2. @;
        DO _I_=1 TO 12;
          PUT SEA 4.3 DAY 5.4 @;
          START=(_I_-1)*24+1;
          FINISH=START+23;
          DO NUMHRS=START TO FINISH;
            PUT HOUR 4.3 @;
          END;
        END;
    PUT NUMSP 3. @;
        DO _I_=1 TO &NUMSPF;
          PUT CAT 5. CLASS 5. SF 5.4 @;
        END;
        DO _I_=1 TO NUMPOLL;
          PUT  CONEFF 4.1 ESTMET 1. @;
        END;
    PUT;
%MEND WRITE;

***** END OF MACRO DEFINITION *****;

***** READ CONTROL OPTIONS FILE
;
DATA _NULL_;
  INFILE COF;
  INPUT @1 VERSION 3.;

* CHECK FOR INVALID COF DATA;
  IF VERSION = 5.2 THEN NUMSPF = 37;
  ELSE IF VERSION = 5.3 THEN NUMSPF = 17;
  ELSE DO;
    PUT '*** FATAL: INVALID INVENTORY VERSION' VERSION=;
    ABORT;
    END;

* BRIEF DIAGNOSTIC REPORT (ECHO COF);
  FILE PRINT NOTITLES;
  PUT // @2 '*** EBCDIC-PS DIAGNOSTIC REPORT ***'//
         @2 '    INVENTORY VERSION: ' VERSION=;
*;
CALL SYMPUT('NUMSPF',NUMSPF);
RUN;
%WRITE
```

```
OPTIONS MPRINT MISSING=' ';
*----------------------------------------------------------------------*

  APPLICATION: FLEXIBLE REGIONAL EMISSIONS DATA SYSTEM (FREDS)

  PROGRAM:  AREA SOURCE SAS TO EBCDIC MODELER'S TAPE CONVERSION

  LANGUAGE:  SAS (VERSION 5.16)

  PURPOSE:  TO PRODUCE AREA SOURCE EBCDIC MODELER'S TAPES FROM SAS
            DATA SET.

  VARIABLE LIST

NAME                            DESCRIPTION
========================================================================
NUMPOLL                 NUMBER OF POLLUTANTS IN EMISSIONS FILE
EMRES                   EMISSIONS RESOLUTION (GRIDDED OR NONGRIDDED)
GMT                     HOUR OF EMISSIONS (GREENWICH MEAN TIME)
COL                     GRID COLUMN
ROW                     GRID ROW
EISSCC                  SOURCE CLASSIFICATION CODE
STATE                   STATE CODE
COUNTY                  COUNTY CODE
TOT1-TOT&NUMPOLL        EMISSIONS TOTALS


  ERROR HANDLING:  INVALID VALUES IN CONTROL OPTIONS FILE WILL
                   HALT EXECUTION.

  METHOD:  READS AND CHECKS CONTROL OPTIONS FILE.  WRITES EMISSIONS DATA
           TO TWO EBCDIC FILES: FOR GRIDDED EMISSSIONS, ALL RECORDS
           WITH COL <= 100 ARE WRITTEN TO FILE1, ALL OTHERS TO FILE2 --
           FOR NON-GRIDDED EMISSIONS, ALL RECORDS ARE WRITTEN TO FILE1.

  PROGRAMMER:  ANDREW ACKERMAN, ALLIANCE TECH CORP, JUNE 1987

*----------------------------------------------------------------------*

***** MACRO DEFINITION *****;

***** MACRO WRITE

***** WRITE SAS EMISSIONS DATA INTO EBCDIC FILES
;
%MACRO WRITE;
%LET NUMPOLL = %EVAL(&NUMPOLL);
%LET EMRES = %SUBSTR(&EMRES,1,1);
%*;
DATA _NULL_; SET INFILE.DATA;
  %IF &EMRES=G %THEN %DO;
     IF COL LE 100 THEN DO;
       FILE FILE1;
       PUT @1 (COL ROW) (4.) GMT 2. (TOT1-TOT&NUMPOLL) (E10.);
       END;
     ELSE DO;
       FILE FILE2;
       PUT @1 (COL ROW) (4.) GMT 2. (TOT1-TOT&NUMPOLL) (E10.);
       END;
   %END;
  %ELSE %DO;
    FILE FILE1;
    PUT @1 EISSCC 8. STATE 2. COUNTY 4. GMT 2.
           (TOT1-TOT&NUMPOLL) (E10.);
    %END;
%*;
%MEND WRITE;

***** END OF MACRO DEFINITION *****;

***** READ CONTROL OPTIONS FILE
;
DATA _NULL_;
  INFILE COF;
  INPUT @1 NUMPOLL 3. @5 EMRES $10.;

* CHECK FOR INVALID COF DATA;
  IF NUMPOLL < 1 THEN DO;
    PUT '*** FATAL: INVALID NUMBER OF POLLUTANTS' NUMPOLL=;
    ABORT;
    END;
  ELSE IF EMRES NE 'GRIDDED' AND EMRES NE 'NONGRIDDED' THEN DO;
    PUT '*** FATAL:  INVALID EMISSIONS RESOLUTION' EMRES=;
    ABORT;
    END;

* BRIEF DIAGNOSTIC REPORT (ECHO COF);
  FILE PRINT NOTITLES;
  PUT // @2 '*** EBCDIC-AS DIAGNOSTIC REPORT ***'//
         @2 '    NUMBER OF POLLUTANTS: ' NUMPOLL= /
         @2 '    EMISSIONS RESOLUTION: ' EMRES=;
*;
CALL SYMPUT('NUMPOLL',NUMPOLL);
CALL SYMPUT('EMRES',EMRES);
RUN;
%WRITE
```

APPENDIX F

DEFINITION OF PARAMETERS AND CODE LISTINGS

Tables F-1 through F-4 contain pollutant SAROAD codes and speciation factor classes used in 1980 NAPAP Versions 5.2 and 5.3. The eleven pollutants contained in the annual 5.0 inventory and their corresponding SAROAD codes are left justified in Tables F-1 and F-3. Codes for NEDS point source estimation methods are given in Table F-5. Table F-6 summarizes the reference numbers for each of the twelve temporal allocation scenarios. Time zone codes for each of the zones in the NAPAP domain are given with the I/O format for the Time Zone File. Tables F-7 through F-9 contain NEDS source classification codes for U.S. and Canadian point sources, U.S. area sources, and Canadian area sources, respectively.

TABLE F-1. 1980 NAPAP VERSION 5.2 INVENTORY POLLUTANT SAROAD CODES

Pollutant	SAROAD Code
SO_2	42401
SO_4	12403
TSP:	11101
- Ca	12111
- Mg	12140
- K	12180
- Na	12184
Pb	12128
CO	42101
HCl (Hydrogen Chloride)	42302
HF (Hydrogen Fluoride)	42303
NO_x:	42602
- NO	42601
- NO_2	42602
NH_3	42604
VOC	43104
THC (Total Hydrocarbons):	43101
- Methane	43201
- Ethane	43202
- Ethylene	43203
- Propane	43204
- Propylene	43205
- N-butane	43212
- Isobutane	43214
- Isobutene	43215
- Trans-2-butene	43216
- Pentane	43220
- Isopentane	43221
- 2,3-diemthylbutane	43244
- Other alkenes	43298
- Other alkanes	43299
- Formic acid	43403
- Acetic acid	43404
- Other organic acids	43499
- Formaldehyde	43502
- Acetaldehyde	43503
- Propionaldehyde	43504
- Acetone	43551
- Other kentones	43598
- Other aldehydes	43599
- Xylene	45102
- Benzene	45201
- Toluene	45202
- Ethylbenzene	45203
- Other aromatics	45999

TABLE F-2. 1980 NAPAP SPECIATION FACTORS - VERSION 5.2

Speciation factor number	Major pollutant SAROAD	Speciation class SAROAD
1	43101	43201
2	43101	43202
3	43101	43204
4	43101	43212
5	43101	43214
6	43101	43244
7	43101	43220
8	43101	43221
9	43101	43299
10	43101	43203
11	43101	43205
12	43101	(Not Used)
13	43101	43215
14	43101	43216
15	43101	43298
16	43101	45201
17	43101	45202
18	43101	45102
19	43101	45203
20	43101	45999
21	43101	43502
22	43101	43503
23	43101	43504
24	43101	43599
25	43101	43551
26	43101	43598
27	43101	43403
28	43101	43404
29	43101	43499
30	43101	(Not used)
31	42602	42601
32	42602	42602
33	11101	12111
34	11101	12140
35	11101	12184
36	11101	12180
37	11101	other

TABLE F-3. 1980 NAPAP VERSION 5.3 INVENTORY POLLUTANT SAROAD CODES

Pollutant	SAROAD Code
SO_2	42401
SO_4	12403
TSP:	11101
- Ca	12111
- Mg	12140
- K	12180
- Na	12184
Pb	12128
CO	42101
HCl (Hydrogen Chloride)	42302
HF (Hydrogen Fluoride)	42303
NO_x:	42602
- NO	42601
- NO_2	42602
NH_3	42604
VOC	43104
THC (Total Hydrocarbons):	43101
- Olefins	43298
- Paraffins	43199
- Toluene	45202
- Xylene	45102
- Formaldehyde	43502
- Other Aldehydes	43511
- Ethylene	43203
- Non-reactives	43899
- Isoprene	43243
- Methane	43201

TABLE F-4. 1980 NAPAP SPECIATION FACTORS - VERSION 5.3

Speciation factor number	Major pollutant SAROAD	Speciation class SAROAD
1	43101	43298
2	43101	43199
3	43101	45202
4	43101	43102
5	43101	43502
6	43101	43511
7	43101	43203
8	43101	43899
9	43101	43243
10	43101	43201
11	42602	42601
12	42602	42602
13	11101	12111
14	11101	12140
15	11101	12184
16	11101	12180
17	11101	other

TABLE F-5. POINT SOURCE EMISSIONS ESTIMATION METHODS USED IN NEDS

AEROS Code	Estimation Method
0	Not applicable (emissions are negligible)
1	Emission based on source test or emission measurements
2	Emissions calculated using a material balance
3	Emissions computer calculated using AP-42 emission factors from the NEDS SCC listing
4	Emission estimated using an emission factor from a similar process
5	Emissions estimated using a special emission factor
6	New construction, not yet operational
7	Facility closed, operations ceased

TABLE F-6. REFERENCE NUMBERS FOR TEMPORAL ALLOCATION SCENARIOS

Temporal allocation reference number	Scenario
1	Winter Weekday
2	Winter Saturday
3	Winter Sunday
4	Spring Weekday
5	Spring Saturday
6	Spring Sunday
7	Summer Weekday
8	Summer Saturday
9	Summer Sunday
10	Fall Weekday
11	Fall Saturday
12	Fall Sunday

TABLE F-7. NEDS SOURCE CLASSIFICATION CODES FOR U.S. AND CANADIAN POINT SOURCES (SIX-DIGIT LEVEL)

SCC	Source Description/Process		
101001	EXTCOMB BOILER	ELECTRIC GENERATN	ANTHRACITE COAL
101002	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL
101003	EXTCOMB BOILER	ELECTRIC GENERATN	LIGNITE
101004	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL
101005	EXTCOMB BOILER	ELECTRIC GENERATN	DISTILLATE OIL
101006	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS
101007	EXTCOMB BOILER	ELECTRIC GENERATN	PROCESS GAS
101008	EXTCOMB BOILER	ELECTRIC GENERATN	COKE
101009	EXTCOMB BOILER	ELECTRIC GENERATN	WOOD/BARK WASTE
101010	EXTCOMB BOILER	ELECTRIC GENERATN	LIQ PETROLEUM GAS
101011	EXTCOMB BOILER	ELECTRIC GENERATN	BAGASSE
101012	EXTCOMB BOILER	ELECTRIC GENERATN	SLD WASTE-SPECIFY
101013	EXTCOMB BOILER	ELECTRIC GENERATN	LIQ WASTE-SPECIFY
102001	EXTCOMB BOILER	INDUSTRIAL	ANTHRACITE COAL
102002	EXTCOMB BOILER	INDUSTRIAL	BITUMINOUS COAL
102003	EXTCOMB BOILER	INDUSTRIAL	LIGNITE
102004	EXTCOMB BOILER	INDUSTRIAL	RESIDUAL OIL
102005	EXTCOMB BOILER	INDUSTRIAL	DISTILLATE OIL
102006	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS
102007	EXTCOMB BOILER	INDUSTRIAL	PROCESS GAS
102008	EXTCOMB BOILER	INDUSTRIAL	COKE
102009	EXTCOMB BOILER	INDUSTRIAL	WOOD/BARK WASTE
102010	EXTCOMB BOILER	INDUSTRIAL	LIQ PETROLEUM GAS
102011	EXTCOMB BOILER	INDUSTRIAL	BAGASSE
102012	EXTCOMB BOILER	INDUSTRIAL	SLD WASTE-SPECIFY
102013	EXTCOMB BOILER	INDUSTRIAL	LIQ WASTE-SPECIFY
102014	EXTCOMB BOILER	INDUSTRIAL	CO BOILER
103001	EXTCOMB BOILER	COMMERCL-INSTUTNL	ANTHRACITE COAL
103002	EXTCOMB BOILER	COMMERCL-INSTUTNL	BITUMINOUS COAL
103003	EXTCOMB BOILER	COMMERCL-INSTUTNL	LIGNITE
103004	EXTCOMB BOILER	COMMERCL-INSTUTNL	RESIDUAL OIL
103005	EXTCOMB BOILER	COMMERCL-INSTUTNL	DISTILLATE OIL
103006	EXTCOMB BOILER	COMMERCL-INSTUTNL	NATURAL GAS
103007	EXTCOMB BOILER	COMMERCL-INSTUTNL	PROCESS GAS
103009	EXTCOMB BOILER	COMMERCL-INSTUTNL	WOOD/BARK WASTE
103010	EXTCOMB BOILER	COMMERCL-INSTUTNL	LIQ PETROLEUM GAS
103012	EXTCOMB BOILER	COMMERCL-INSTUTNL	SLD WASTE-SPECIFY
103013	EXTCOMB BOILER	COMMERCL-INSTUTNL	LIQ WASTE-SPECIFY
105001	EXTCOMB BOILER	SPACE HEATER	INDUSTRIAL
105002	EXTCOMB BOILER	SPACE HEATER	COMMERCL-INSTUTNL
201001	INTERNLCOMBUSTION	ELECTRIC GENERATN	DIST.OIL/DIESEL
201002	INTERNLCOMBUSTION	ELECTRIC GENERATN	NATURAL GAS
201009	INTERNLCOMBUSTION	ELECTRIC GENERATN	KERONAPTHA JET FL
201010	INTERNLCOMBUSTION	ELECTRIC GENERATN	GEYSERS/GEOTHERML

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
202001	INTERNLCOMBUSTION	INDUSTRIAL	DIST.OIL/DIESEL
202002	INTERNLCOMBUSTION	INDUSTRIAL	NATURAL GAS
202003	INTERNLCOMBUSTION	INDUSTRIAL	GASOLINE
202004	INTERNLCOMBUSTION	INDUSTRIAL	LARGE BORE ENGINE
202005	INTERNLCOMBUSTION	INDUSTRIAL	RESIDUAL/CRUDEOIL
202009	INTERNLCOMBUSTION	INDUSTRIAL	KERONAPTHA JET FL
202010	INTERNLCOMBUSTION	INDUSTRIAL	PROPANE
203001	INTERNLCOMBUSTION	COMMERCL-INSTUTNL	DIST.OIL/DIESEL
203002	INTERNLCOMBUSTION	COMMERCL-INSTUTNL	NATURAL GAS
203003	INTERNLCOMBUSTION	COMMERCL-INSTUTNL	GASOLINE
203010	INTERNLCOMBUSTION	COMMERCL-INSTUTNL	PROPANE
204001	INTERNLCOMBUSTION	ENGINE TESTING	AIRCRAFT
204002	INTERNLCOMBUSTION	ENGINE TESTING	ROCKET MOTOR
204003	INTERNLCOMBUSTION	ENGINE TESTING	TURBINE
204004	INTERNLCOMBUSTION	ENGINE TESTING	RECIPROCATING
288888	INTERNLCOMBUSTION	FUGITIVE EMISSION	NOT CLASSIFIED
301001	CHEMICAL MFG	ORGANIC CHEMICALS	ADIPIC ACID PROD
301003	CHEMICAL MFG	AGRICULTURAL CHEM	AMMONIA
301005	CHEMICAL MFG	CARBON BLACK	CHANNEL PROCESS
301006	CHEMICAL MFG	ORGANIC CHEMICALS	CHARCOAL
301007	CHEMICAL MFG	INORGANIC CHEMCLS	CHLORINE
301008	CHEMICAL MFG	INORGANIC CHEMCLS	CHLORO-ALKALI
301009	CHEMICAL MFG	SOAP/DETERGENTS	SOAP/DETERGENTS
301010	CHEMICAL MFG	EXPLOSIVES	TRINITROTOLUENE
301011	CHEMICAL MFG	INORGANIC CHEMCLS	HYDROCHLORIC ACID
301012	CHEMICAL MFG	INORGANIC CHEMCLS	HYDROFLUORIC ACID
301013	CHEMICAL MFG	AGRICULTURAL CHEM	NITRIC ACID
301014	CHEMICAL MFG	PAINT MFG	MIXING/BLENDING
301015	CHEMICAL MFG	VARNISH MFG	BODYING OIL
301016	CHEMICAL MFG	AGRICULTURAL CHEM	PHOS ACD/WET PROC
301017	CHEMICAL MFG	AGRICULTURAL CHEM	PHOS ACID THERMAL
301018	CHEMICAL MFG	PLASTICS PRODN	POLYVINYL CHLORID
301019	CHEMICAL MFG	ORGANIC CHEMICALS	PHTHALIC ANHYDRID
301020	CHEMICAL MFG	PRINTING INK MFG	VEHICLE COOKING
301021	CHEMICAL MFG	INORGANIC CHEMCLS	SODIUM CARBONATE
301022	CHEMICAL MFG	INORGANIC CHEMCLS	H2SO4-CHAMBER
301023	CHEMICAL MFG	INORGANIC CHEMCLS	H2SO4-CONTACT
301024	CHEMICAL MFG	PLASTICS PRODN	SYNTHC ORGNC FIBR
301025	CHEMICAL MFG	PLASTICS PRODN	CELLULOSIC FIBER

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
301026	CHEMICAL MFG	PLASTICS PRODN	SYNTHETIC RUBBER
301027	CHEMICAL MFG	AGRICULTURAL CHEM	FERTILIZ AMONNITR
301028	CHEMICAL MFG	AGRICULTURAL CHEM	NRM SPRPHSPHATE
301029	CHEMICAL MFG	AGRICULTURAL CHEM	TRPL SPRPHSPHATE
301030	CHEMICAL MFG	AGRICULTURAL CHEM	AMMONM PHOSPHATES
301031	CHEMICAL MFG	ORGANIC CHEMICALS	TEREPHTHALIC ACID
301032	CHEMICAL MFG	INORGANIC CHEMCLS	SULFUR(ELEMENTAL)
301033	CHEMICAL MFG	AGRICULTURAL CHEM	PESTICIDES
301034	CHEMICAL MFG	ORGANIC CHEMICALS	ANILINE
301035	CHEMICAL MFG	INORGANIC CHEMCLS	TIO2 PIGMENT
301038	CHEMICAL MFG	INORGANIC CHEMCLS	SODIUM BICARBNATE
301039	CHEMICAL MFG	INORGANIC CHEMCLS	HYDROGEN CYANIDE
301040	CHEMICAL MFG	AGRICULTURAL CHEM	UREA
301041	CHEMICAL MFG	EXPLOSIVES	NITROCELLULOSE
301042	CHEMICAL MFG	ORGANIC CHEMICALS	LEAD ALKYL-NA/PB
301043	CHEMICAL MFG	ORGANIC CHEMICALS	LEAD ALKYLS
301045	CHEMICAL MFG	AGRICULTURAL CHEM	ORGANIC FERTILIZR
301050	CHEMICAL MFG	ORGANIC CHEMICALS	ADHESIVES
301060	CHEMICAL MFG	PHARMACEUTICALS	GENERAL PROCESSES
301070	CHEMICAL MFG	INORGANIC CHEMCLS	GENERAL PROCESSES
301091	CHEMICAL MFG	ORGANIC CHEMICALS	KETONE PRODUCTION
301100	CHEMICAL MFG	ORGANIC CHEMICALS	MALEIC ANHYDRIDE
301111	CHEMICAL MFG	INORGANIC CHEMCLS	ASBESTOS CHEMICAL
301120	CHEMICAL MFG	ORGANIC CHEMICALS	FORMALDEHYDE
301121	CHEMICAL MFG	ORGANIC CHEMICALS	ORGNC DYE/PIGMENT
301124	CHEMICAL MFG	ORGANIC CHEMICALS	CHLOROPRENE
301125	CHEMICAL MFG	ORGANIC CHEMICALS	ETHYLENE DICHLORD
301126	CHEMICAL MFG	ORGANIC CHEMICALS	ORGANOHALOGENS
301127	CHEMICAL MFG	ORGANIC CHEMICALS	FLUOROCARBONS
301130	CHEMICAL MFG	AGRICULTURAL CHEM	AMMONIUM SULFATE
301132	CHEMICAL MFG	ORGANIC CHEMICALS	ORGANIC ACIDS PRD
301133	CHEMICAL MFG	ORGANIC CHEMICALS	ACETIC ANHYDRIDE
301137	CHEMICAL MFG	ORGANIC CHEMICALS	ESTERS PRODUCTN
301140	CHEMICAL MFG	ORGANIC CHEMICALS	ACETYLENE PRODN
301152	CHEMICAL MFG	ORGANIC CHEMICALS	BISPHENOL A
301153	CHEMICAL MFG	ORGANIC CHEMICALS	BUTADIENE
301156	CHEMICAL MFG	ORGANIC CHEMICALS	CUMENE
301157	CHEMICAL MFG	ORGANIC CHEMICALS	CYCLOHEXANE
301158	CHEMICAL MFG	ORGANIC CHEMICALS	CYCLOHEXANONE/CYC
301167	CHEMICAL MFG	ORGANIC CHEMICALS	VINYL ACETATE
301169	CHEMICAL MFG	ORGANIC CHEMICALS	ETHYLBENZENE
301174	CHEMICAL MFG	ORGANIC CHEMICALS	ETHYLENE OXIDE
301176	CHEMICAL MFG	ORGANIC CHEMICALS	GLYCERIN(GLYCERL)
301181	CHEMICAL MFG	ORGANIC CHEMICALS	TOLUENE DIISOCYNT
301190	CHEMICAL MFG	ORGANIC CHEMICALS	METHYL METHACRYLT

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
301195	CHEMICAL MFG	ORGANIC CHEMICALS	NITROBENZENE
301197	CHEMICAL MFG	ORGANIC CHEMICALS	ETHYLENE PRODCTN
301202	CHEMICAL MFG	ORGANIC CHEMICALS	PHENOL
301205	CHEMICAL MFG	ORGANIC CHEMICALS	PROPYLENE OXIDE
301206	CHEMICAL MFG	ORGANIC CHEMICALS	STYRENE
301210	CHEMICAL MFG	ORGANIC CHEMICALS	CAPROLACTUM
301211	CHEMICAL MFG	ORGANIC CHEMICALS	LINEAR ALKYLBENZE
301250	CHEMICAL MFG	ORGANIC CHEMICALS	METHANOL PRODCTN
301251	CHEMICAL MFG	ORGANIC CHEMICALS	ETHYLENE GLYCOL
301252	CHEMICAL MFG	ORGANIC CHEMICALS	ETHERS
301253	CHEMICAL MFG	ORGANIC CHEMICALS	GLYCOL ETHERS
301254	CHEMICAL MFG	ORGANIC CHEMICALS	NITRILES PROD
301258	CHEMICAL MFG	ORGANIC CHEMICALS	BENZENE
301301	CHEMICAL MFG	ORGANIC CHEMICALS	CHLOROBENZENE
301302	CHEMICAL MFG	ORGANIC CHEMICALS	CARBON TETRACHLOR
301303	CHEMICAL MFG	ORGANIC CHEMICALS	ALLYL CHLORIDE
301304	CHEMICAL MFG	ORGANIC CHEMICALS	ALLYL ALCOHOL
301305	CHEMICAL MFG	ORGANIC CHEMICALS	EPICHLOROHYDRIN
301800	CHEMICAL MFG	ORGANIC CHEMICALS	GENERAL PROCESSES
301810	CHEMICAL MFG	ORGANIC CHEMICALS	GENERAL PROCESSES
301820	CHEMICAL MFG	ORGANIC CHEMICALS	GENERAL PROCESSES
301830	CHEMICAL MFG	ORGANIC CHEMICALS	GENERAL PROCESSES
301840	CHEMICAL MFG	ORGANIC CHEMICALS	GENERAL PROCESSES
301870	INORGNC CHEM STRG	FIXED ROOF TANKS	HYDROCHLORIC ACID
301875	INORGNC CHEM STRG	FLOAT ROOF TANKS	CARBON DISULFIDE
301885	INORGNC CHEM STRG	PRESSURE TANKS	AMMONIA
301888	CHEMICAL MFG	FUGITIVE EMISSION	NOT CLASSIFIED
301900	CHEMICAL MFG	FUEL-FIRED EQPMNT	PROCESS HEATERS
301999	CHEMICAL MFG	MISCELLANEOUS	NOT CLASSIFIED
302001	FOOD/AGRICULTURE	ALFALFA DEHYDRATI	GENERAL
302002	FOOD/AGRICULTURE	COFFEE ROASTING	ROASTER
302003	FOOD/AGRICULTURE	COFFEE PRODUCTS	INSTANT COFFEE
302004	FOOD/AGRICULTURE	AGRIC. SERVICES	COTTON GINNING
302005	FOOD/AGRICULTURE	GRAIN ELEVATORS	ERMINAL ELEVATOR
302006	FOOD/AGRICULTURE	GRAIN ELEVATORS	COUNTRY ELEVATORS
302007	FOOD/AGRICULTURE	GRAIN MILLING	CORN MEAL
302008	FOOD/AGRICULTURE	FEED MANUFACTURE	BARLEY FEED
302009	FOOD/AGRICULTURE	FERMENTATION	BEER PRODUCTION
302010	FOOD/AGRICULTURE	FERMENTATION	WHISKEY PRODUCTN
302011	FOOD/AGRICULTURE	FERMENTATION	WINE PRODUCTION
302012	FOOD/AGRICULTURE	FISH PROCESSING	FISH MEAL
302013	FOOD/AGRICULTURE	MEAT SMOKING	COMBINED OPERATNS
302014	FOOD/AGRICULTURE	STARCH MFG	COMBINED OPERATNS
302015	FOOD/AGRICULTURE	SUGAR CANE PROCES	GENERAL

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
302016	FOOD/AGRICULTURE	SUGAR BEET PROCES	DRYER
302017	FOOD/AGRICULTURE	PEANUT PROCESSING	NOT CLASSIFIED
302018	FOOD/AGRICULTURE	CANDY MANUFACTURE	NOT CLASSIFIED
302019	FOOD/AGRICULTURE	VEG OIL PROCESSNG	CORN OIL
302020	FOOD/AGRICULTURE	AGRIC.PRODUCTION	BEEF CATTLE
302021	FOOD/AGRICULTURE	POULTRY/EGG PROD	MANURE HANDLING
302022	FOOD/AGRICULTURE	AGRIC.PRODUCTION	COTTON-ACID DELIN
302026	FOOD/AGRICULTURE	AGRIC.PRODUCTION	SEED PROCESSING
302028	FOOD/AGRICULTURE	AGRIC.PRODUCTION	MUSHROOM GROWING
302030	FOOD/AGRICULTURE	DAIRY PRODUCTS	MILK
302031	FOOD/AGRICULTURE	GRAIN ELEVATORS	EXPORT GRAIN ELEV
302032	FOOD/AGRICULTURE	BAKERIES	BREAD BAKING
302033	FOOD/AGRICULTURE	TOBACCO PRODUCTS	NOT CLASSIFIED
302036	FOOD/AGRICULTURE	DEEP FAT FRYING	COOKING VATS
302038	FOOD/AGRICULTURE	ANIMAL/POLTRY RND	RENDERING
302888	FOOD/AGRICULTURE	FUGITIVE EMISSION	NOT CLASSIFIED
302900	FOOD/AGRICULTURE	FUEL-FIRED EQPMNT	PROCESS HEATERS
302999	FOOD/AGRICULTURE	MISCELLANEOUS	NOT CLASSIFIED
303000	MINING OPERATIONS	METAL ORE MINING	BAUXITE
303001	PRIMARY METALS	ALUMINUM	ELECTRO-REDUCTION
303002	PRIMARY METALS	ALUMINUM	HYDROXIDE CALCING
303003	PRIMARY METALS	IRON & STEEL	BY-PRODUCT COKE
303004	PRIMARY METALS	IRON & STEEL	BEEHIVE COKE
303005	PRIMARY METALS	COPPER SMELTING	MULTIPLE HEARTH
303006	PRIMARY METALS	FERROALLOY	OPEN FURNACE
303007	PRIMARY METALS	FERROALLOY	SEMICOVERED FURNC
303008	PRIMARY METALS	IRON & STEEL	BLAST FURNACE
303009	PRIMARY METALS	IRON & STEEL	STEEL FURNACES
303010	PRIMARY METALS	LEAD SMELTING	SINTERING
303011	MINING OPERATIONS	METAL ORE MINING	MOLYBEDENUM
303012	MINING OPERATIONS	METAL ORE MINING	TITANIUM ORE
303013	MINING OPERATIONS	METAL ORE MINING	GOLD MINING
303014	MINING OPERATIONS	METAL ORE MINING	BARIUM ORE
303023	MINING OPERATIONS	METAL ORE MINING	TACONITE IRON ORE
303024	MINING OPERATIONS	METAL ORE MINING	LOW MOISTURE ORE
303030	PRIMARY METALS	ZINC SMELTING	ROASTING
303888	PRIMARY METALS	FUGITIVE EMISSION	NOT CLASSIFIED
303900	PRIMARY METALS	FUEL-FIRED EQPMNT	PROCESS HEATERS
303999	PRIMARY METALS	MISCELLANEOUS	NOT CLASSIFIED
304001	SECONDARY METALS	SEC. ALUMINUM	SWEATING FURNACE
304002	SECONDARY METALS	SEC. COPPER	ELEC INDUCTION FN
304003	PRIMARY METALS	IRON/STEEL FOUNDY	GRAY IRON FOUNDRY
304004	SECONDARY METALS	SEC. LEAD	KETTLE REFINING
304005	ELECTRICAL EQPMNT	LEAD BATTERY MFG	OVERALL PROCESS

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
304006	PRIMARY METALS	MAGNESIUM	POT FURNACE
304007	PRIMARY METALS	IRON/STEEL FOUNDY	STEEL FOUNDRY
304008	SECONDARY METALS	SECONDARY ZINC	RETORT FURNACE
304009	PRIMARY METALS	IRON/STEEL FOUNDY	MALLEABLE IRON
304010	PRIMARY METALS	NICKEL	FLUX FURNACE
304020	ELECTRICAL EQPMNT	FURNACE ELECTRODE	CALCINATION
304022	SECONDARY METALS	METAL HEAT TREATG	FURNACE
304040	SECONDARY METALS	METALLIC COATING	LEAD CABLE COATNG
304049	SECONDARY METALS	MISC CAST/FABRCTN	WAX BURNOUT OVEN
304050	SECONDARY METALS	MISC CAST/FABRCTN	NOT CLASSIFIED
304888	SECONDARY METALS	FUGITIVE EMISSION	NOT CLASSIFIED
304900	SECONDARY METALS	FUEL-FIRED EQPMNT	PROCESS HEATERS
304999	SECONDARY METALS	MISCELLNNEOUS	NOT CLASSIFIED
305001	PETROLEUM INDRY	ASPHALT ROOFING	ASPHALT BLOWING
305002	PETROLEUM INDRY	ASPHALT CONCRETE	ROTARY DRYER
305003	MINERAL PRODUCTS	BRICK MFG	RAW MATERIAL
305004	MINERAL PRODUCTS	CALCIUM CARBIDE	ELECTRIC FURNACE
305005	MINERAL PRODUCTS	CASTABLE REFRACTY	RAW MATERIAL
305006	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS
305007	MINERAL PRODUCTS	CEMENT MFG	WET PROCESS
305008	MINERAL PRODUCTS	CERAMIC CLAY MFG	DRYING
305009	MINERAL PRODUCTS	CLAY/FLYASH SINTR	FLYASH
305010	MINING OPERATIONS	COAL CLEANING	THERMAL DRYER
305011	MINERAL PRODUCTS	CONCRETE BATCHING	GENERAL
305012	MINERAL PRODUCTS	FIBERGLASS	WOOL-TYPE FIBER
305013	MINERAL PRODUCTS	FRIT MFG	ROTARY FURNACE
305014	MINERAL PRODUCTS	GLASS MFG	SODA LIME
305015	MINERAL PRODUCTS	GYPSUM MFG	ROTARY ORE DRYER
305016	MINERAL PRODUCTS	LIME MFG	PRIMARY CRUSHING
305017	MINERAL PRODUCTS	MINERAL WOOL	CUPOLA
305018	MINERAL PRODUCTS	PERLITE MFG	VERTICAL FURNACE
305019	MINING OPERATIONS	NONMETALLIC MINRL	PHOSPHATE ROCK
305020	MINING OPERATIONS	NONMETALLIC MINRL	STONE QUARRYING
305021	MINING OPERATIONS	NONMETALLIC MINRL	SALT MINING
305022	MINING OPERATIONS	NONMETALLIC MINRL	POTASH PRODUCTION
305024	MINING OPERATIONS	NONMETALLIC MINRL	MAGNESIUM CRBNATE
305025	MINING OPERATIONS	NONMETALLIC MINRL	SAND/GRAVEL
305026	MINING OPERATIONS	NONMETALLIC MINRL	DIATOMACOUS EARTH
305030	MINERAL PRODUCTS	CERAMIC ELEC PRTS	NOT CLASSIFIED
305031	MINING OPERATIONS	NONMETALLIC MINRL	ASBESTOS MINING
305032	MINING OPERATIONS	NONMETALLIC MINRL	ASBESTOS MILLING
305033	MINING OPERATIONS	NONMETALLIC MINRL	VERMICULITE
305040	MINING OPERATIONS	UNSPECIFIED ORE	SEE COMMENT

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
305100	MINERAL PRODUCTS	BULK MATERIALS	ELEVATORS
305101	MINERAL PRODUCTS	BULK MATERIALS	CONVEYORS
305102	MINERAL PRODUCTS	BULK MATERIALS	STOAGE BINS
305103	MINERAL PRODUCTS	BULK MATERIALS	OPEN STOCKPILES
305104	MINERAL PRODUCTS	BULK MATERIALS	UNLOADING OPERATN
305105	MINERAL PRODUCTS	BULK MATERIALS	LOADING OPERATION
305150	MINERAL PRODUCTS	NONMETALLIC MINRL	CALCINING-GENERAL
305888	MINERAL PRODUCTS	FUGITIVE EMISSION	NOT CLASSIFIED
305900	MINERAL PRODUCTS	FUEL-FIRED EQPMNT	PROCESS HEATERS
305999	MINERAL PRODUCTS	MISCELLANEOUS	NOT CLASSIFIED
306001	PETROLEUM INDRY	PETROLEUM REFNG	PROCESS HEATERS
306002	PETROLEUM INDRY	PETROLEUM REFNG	CATALYTIC CRACKNG
306003	PETROLEUM INDRY	PETROLEUM REFNG	CATALYTIC CRACKNG
306004	PETROLEUM INDRY	PETROLEUM REFNG	BLOWDOWN SYSTEM
306005	PETROLEUM INDRY	FUGITIVE HC EMIS	PROCESS DRAINS
306006	PETROLEUM INDRY	PETROLEUM REFNG	VACUUM DISTILATN
306007	PETROLEUM INDRY	PETROLEUM REFNG	COOLING TOWERS
306008	PETROLEUM INDRY	FUGITIVE HC EMIS	PIPELINE
306009	PETROLEUM INDRY	PETROLEUM REFNG	FLARES
306010	PETROLEUM INDRY	PETROLEUM REFNG	SLUDGE CONVERTER
306011	PETROLEUM INDRY	PETROLEUM REFNG	ASPHALT BLOWING
306012	PETROLEUM INDRY	PETROLEUM REFNG	FLUID COKING
306014	PETROLEUM INDRY	PETROLEUM REFNG	PETROLEUM COKE
306015	PETROLEUM INDRY	PETROLEUM REFNG	BAUXITE BURNING
306099	PETROLEUM INDRY	PETROLEUM REFNG	INCINERATORS
306100	PETROLEUM INDRY	LUBE OIL MFG	GENERAL
306888	PETROLEUM INDRY	FUGITIVE EMISSION	NOT CLASSIFIED
306999	PETROLEUM INDRY	MISCELLANEOUS	NOT CLASSIFIED
307001	PULP & PAPER	KRAFT PULPING	DIGESTOR/BLOW TNK
307002	PULP & PAPER	SULFITE PULPING	DIGESTER/BLOW PIT
307003	PULP & PAPER	SEMICHEMICAL PULP	DIGESTER/BLOW PIT
307004	PULP & PAPER	PULPBOARD	PAPERBOARD
307005	WOOD PRODUCTS	WOOD PRESS TREAT	CREOSOTE
307007	WOOD PRODUCTS	PLYWOOD/PARTBOARD	VENEER DRYERS
307008	WOOD PRODUCTS	SAWMILL OPERATION	LOG DEBARKING
307011	PULP & PAPER	PAPER COATING	EXTRUSION COATING
307013	PULP & PAPER	MISC. PAPER PROD	INSULATION FROM
307020	WOOD PRODUCTS	FURNITURE MFG	NOT CLASSIFIED
307030	WOOD PRODUCTS	MISCELLANEOUS	WOODWASTE STORAGE
307888	WOOD PRODUCTS	FUGITIVE EMISSION	NOT CLASSIFIED
307900	WOOD PRODUCTS	FUEL FIRED EQPMNT	PROCESS HEATERS
307999	WOOD PRODUCTS	MISCELLANEOUS	NOT CLASSIFIED
308001	RUBBER/PLASTICS	TIRE MFG	UNDERTREAD & SIDE
308005	RUBBER/PLASTICS	TIRE RETREADING	TIRE BUFFING

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
308006	RUBBER/PLASTICS	MISC.RUBBER PROD	NOT CLASSIFIED
308007	RUBBER/PLASTICS	FAB. PLASTIC PROD	PLASTICS MACHINNG
308900	RUBBER/PLASTICS	FUEL FIRED EQPMNT	PROCESS HEATERS
308999	RUBBER/PLASTICS	MISCELLANEOUS	NOT CLASSIFIED
309001	FABRICATED METALS	IRON/STEEL	NOT CLASSIFIED
309002	FABRICATED METALS	ABRASIVE BLASTING	OF METAL PARTS
309003	FABRICATED METALS	ABRASIVE CLEANING	OF METAL PARTS
309010	FABRICATED METALS	ELECTROPLATING	ENTIRE PROCESS
309011	FABRICATED METALS	CONVERSION COATNG	ALKALINE CLEANING
309015	FABRICATED METALS	CHEMICAL MILLING	F METAL PARTS
309016	FABRICATED METALS	PIPE COATING	ASPHALT DIPPING
309020	FABRICATED METALS	CAN MAKING OPRNS	NOT CLASSIFIED
309025	FABRICATED METALS	DRUMS/BARRELS	DRUM CLEANING
309030	FABRICATED METALS	MACHINING OPRNS	GRINDING
309040	FABRICATED METALS	METAL DEPOSITION	METALLIZING(WIRE
309060	FABRICATED METALS	PORCELAIN ENAMEL/	CERAMIC GLAZE
309888	FABRICATED METALS	FUGITIVE EMISSION	NOT CLASSIFIED
309900	FABRICATED METALS	FUEL FIRED EQPMNT	PROCESS HEATERS
309999	FABRICATED METALS	MISCELLANEOUS	NOT CLASSIFIED
310001	OIL & GAS PRODN	CRUDE OIL PRODN	COMPLETE WELL
310002	OIL & GAS PRODN	NATURAL GAS PRODN	GAS SWEETENING
310004	OIL & GAS PRODN	FUEL-FIRED EQPMNT	PROCESS HEATERS
310888	OIL & GAS PRODN	FUGITIVE EMISSION	NOT CLASSIFIED
311001	CONSTRUCTION	BLDG CONTRACTORS	NOT CLASSIFIED
311002	CONSTRUCTION	SPL TRADE CONTRCT	NOT CLASSIFIED
312999	MACHINERY	MISCELLANEOUS	NOT CLASSIFIED
313070	ELECTRICAL EQPMNT	WINDINGS RECLAMTN	INCINERATOR OVEN
313900	ELECTRICAL EQPMNT	FUEL FIRED EQPMNT	PROCESS HEATERS
313999	ELECTRICAL EQPMNT	MISCELLANEOUS	NOT CLASSIFIED
314009	TRANSPORTN EQPMNT	GENERAL PROCESSES	SOLDER JOINT
314010	TRANSPORTN EQPMNT	BRAKE SHOE DEBOND	INCINERATOR OVEN
314011	TRANSPORTN EQPMNT	AUTO BODY SALVAGE	BODY SHREDDING
314999	TRANSPORTN EQPMNT	MISCELLANEOUS	NOT CLASSIFIED
315010	MISC. INDUSTRIES	PHOTOGRAPHIC EQPT	PHOTOCOPY MACHINE
315020	MISC. INDUSTRIES	HOSPITALS	STERILIZATION
320999	LEATHER PRODUCTS	MISCELLANEOUS	NOT CLASSIFIED
330001	TEXTILE PRODUCTS	GENERAL FABRICS	NOT CLASSIFIED
330002	RUBBER/PLASTICS	RUBBERIZED FABRIC	IMPREGNATION
330003	TEXTILE PRODUCTS	CARPET OPERATNS	NOT CLASSIFIED
330004	TEXTILE PRODUCTS	FABRIC FINISHING	NOT CLASSIFIED
330005	TEXTILE PRODUCTS	APPAREL	NOT CLASSIFIED
330888	TEXTILE PRODUCTS	FUGITIVE EMISSION	NOT CLASSIFIED
360001	PRINTING/PUBLISH	TYPESETTING	LEAD REMELTING
390001	INDUSTRIAL PROCES	INPROCESS FUEL	ANTHRACITE COAL
390002	INDUSTRIAL PROCES	INPROCESS FUEL	BITUMINOUS COAL

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
390003	INDUSTRIAL PROCES	INPROCESS FUEL	LIGNITE
390004	INDUSTRIAL PROCES	INPROCESS FUEL	RESIDUAL OIL
390005	INDUSTRIAL PROCES	INPROCESS FUEL	DISTILLATE OIL
390006	INDUSTRIAL PROCES	INPROCESS FUEL	NATURAL GAS
390007	INDUSTRIAL PROCES	INPROCESS FUEL	PROCESS GAS
390008	INDUSTRIAL PROCES	INPROCESS FUEL	COKE
390009	INDUSTRIAL PROCES	INPROCESS FUEL	WOOD
390010	INDUSTRIAL PROCES	INPROCESS FUEL	LPG
390012	INDUSTRIAL PROCES	INPROCESS FUEL	SOLID WASTE FUEL
390013	INDUSTRIAL PROCES	INPROCESS FUEL	LIQUID WASTE FUEL
399900	INDUSTRIAL PROCES	MIS IND-FUEL EQPT	PROCESS HEATERS
399999	INDUSTRIAL PROCES	MISCELLANEOUS	NOT CLASSIFIED
401001	ORGANIC SOLVENT	DRY CLEANING	PERCHLOROETHYLENE
401002	ORGANIC SOLVENT	VAPOR DEGREASING	OPEN-TOP
401003	ORGANIC SOLVENT	COLD CLEANING	METHANOL
401004	ORGANIC SOLVENT	TEXTILE MFG	FABRIC SCOURING
401888	ORGANIC SOLVENT	FUGITIVE EMISSION	NOT CLASSIFIED
402001	ORGANIC SOLVENT	SURFACE COATING	PAINT-GENERAL
402002	ORGANIC SOLVENT	SURFACE COATING	PAINT-GENERAL
402003	ORGANIC SOLVENT	SURFACE COATING	VARNISH/SHELLAC
402004	ORGANIC SOLVENT	SURFACE COATING	LACQUER
402005	ORGANIC SOLVENT	SURFACE COATING	ENAMEL
402006	ORGANIC SOLVENT	SURFACE COATING	PRIMER
402007	ORGANIC SOLVENT	SURFACE COATING	ADHESIVE
402008	ORGANIC SOLVENT	SURFACE COATING	COATING OVEN
402009	ORGANIC SOLVENT	SURFACE COATING	SHINNING SOLVENT
402010	ORGANIC SOLVENT	SURFACE COATING	OVEN HEATER
402011	ORGANIC SOLVENT	SURFACE COATING	FABRIC COATING
402012	ORGANIC SOLVENT	SURFACE COATING	FABRIC DYEING
402013	ORGANIC SOLVENT	SURFACE COATING	PAPER COATING
402014	ORGANIC SOLVENT	SURFACE COATING	LARGE APPLIANCES
402015	ORGANIC SOLVENT	SURFACE COATING	MAGNET WIRE
402016	ORGANIC SOLVENT	SURFACE COATING	AUTOS/LIGHT TRUCK
402017	ORGANIC SOLVENT	SURFACE COATING	CAN COATING
402018	ORGANIC SOLVENT	SURFACE COATING	COIL COATING
402019	ORGANIC SOLVENT	SURFACE COATING	WOOD FURNITURE
402020	ORGANIC SOLVENT	SURFACE COATING	METAL FURNITURE
402021	ORGANIC SOLVENT	SURFACE COATING	FLATWOOD PRODUCTS
402022	ORGANIC SOLVENT	SURFACE COATING	PLASTIC PARTS
402023	ORGANIC SOLVENT	SURFACE COATING	LARGE SHIPS
402024	ORGANIC SOLVENT	SURFACE COATING	LARGE AIRCRAFT
402025	ORGANIC SOLVENT	SURFACE COATING	MISC.METAL PARTS
402026	ORGANIC SOLVENT	SURFACE COATING	STEEL DRUMS
402888	ORGANIC SOLVENT	SURFACE COATING	FUGITIVE EMISSION
402900	ORGANIC SOLVENT	SURFACE COATING	FLARES

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
402999	ORGANIC SOLVENT	SURFACE COATING	MISCELLANEOUS
403001	PETROLEUM STORAGE	FIXED ROOF TANKS	BREATHING LOSS
403002	PETROLEUM STORAGE	FLOAT ROOF TANKS	STAND STG LOSS
403003	PETROLEUM STORAGE	VAR.VAPOR SP.TNKS	WORKING LOSS
403010	PETROLEUM STORAGE	FIXED ROOF TANKS	GASOLINE-RVP 13
403011	PETROLEUM STORAGE	FLOAT ROOF TANKS	GASOLINE-RVP 13
403012	PETROLEUM STORAGE	VAR.VAPOR SP.TNKS	GASOLINE-RVP 13
403888	PETROLEUM STORAGE	FUGITIVE EMISSION	NOT CLASSIFIED
403999	PETROLEUM STORAGE	MISCELLANEOUS	NOT CLASSIFIED
404001	BULK TERMINALS	FIXED ROOF TANKS	GASOLINE-RVP 13
404002	BULK PLANTS	FIXED ROOF TANKS	GASOLINE-RVP 13
404003	OIL & GAS PRODN	CRUDE OIL STORAGE	FIXED ROOF TANK
404004	PETROLEUM STORAGE	UNDERGROUND TANKS	GASOLINE-RVP 13
405001	PRINTING/PUBLISH	PRINTING PROCESS	DRYER
405002	PRINTING/PUBLISH	PRINTING PROCESS	LETTER PRESS
405003	PRINTING/PUBLISH	PRINTING PROCESS	FLEXOGRAPHIC
405004	PRINTING/PUBLISH	PRINTING PROCESS	LITHOGRAPHIC
405005	PRINTING/PUBLISH	PRINTING PROCESS	ROTOGRAVURE
405006	PRINTING/PUBLISH	PRINTING PROCESS	INK MIXING
405007	PRINTING/PUBLISH	PRINTING PROCESS	SOLVENT STORAGE
405888	PRINTING/PUBLISH	FUGITIVE EMISSION	NOT CLASSIFIED
406001	PETROLEUM MARKTNG	TANK CARS/TRUCKS	GASOLINE-SPLASH
406002	PETROLEUM MARKTNG	MARINE VESSELS	GASOLINE SHIP
406003	PETROLEUM MARKTNG	SERVICE STATIONS	STAGE I
406004	PETROLEUM MARKTNG	SERVICE STATIONS	STAGE II
406888	PETROLEUM MARKTNG	FUGITIVE EMISSION	NOT CLASSIFIED
407004	ORGANIC CHEM STRG	FIXED ROOF TANKS	ACETIC ANHYDRIDE
407008	ORGANIC CHEM STRG	FIXED ROOF TANKS	N-BUTYL ALCOHOL
407016	ORGANIC CHEM STRG	FIXED ROOF TANKS	N-DECANE
407020	ORGANIC CHEM STRG	FIXED ROOF TANKS	DODECENE
407032	ORGANIC CHEM STRG	FIXED ROOF TANKS	ANILINE
407036	ORGANIC CHEM STRG	FIXED ROOF TANKS	BENZENE
407040	ORGANIC CHEM STRG	FIXED ROOF TANKS	ACETIC ACID
407044	ORGANIC CHEM STRG	FIXED ROOF TANKS	BUTYL ACETATE
407048	ORGANIC CHEM STRG	FIXED ROOF TANKS	MTHL-TRT-BTYL ETH
407052	ORGANIC CHEM STRG	FIXED ROOF TANKS	BUTYL CARBITOL
407056	ORGANIC CHEM STRG	FIXED ROOF TANKS	1,4-BUTANEDIOL
407060	ORGANIC CHEM STRG	FIXED ROOF TANKS	BENZYL CHLORIDE
407064	ORGANIC CHEM STRG	FIXED ROOF TANKS	MDI
407068	ORGANIC CHEM STRG	FIXED ROOF TANKS	CYCLOHEXANONE
407076	ORGANIC CHEM STRG	FIXED ROOF TANKS	ACRYLONITRILE
407080	ORGANIC CHEM STRG	FIXED ROOF TANKS	NITROBENZENE
407084	ORGANIC CHEM STRG	FIXED ROOF TANKS	NONYPHENOL
407172	ORGANIC CHEM STRG	FLOAT ROOF TANKS	ACETALDEHYDE

(continued)

TABLE F-7 (continued)

SCC	Source Description/Process		
407176	ORGANIC CHEM STRG	FLOAT ROOF TANKS	CYCLOHEXANE
407180	ORGANIC CHEM STRG	FLOAT ROOF TANKS	ISOPRENE
407208	ORGANIC CHEM STRG	FLOAT ROOF TANKS	ETHYL ETHER
407220	ORGANIC CHEM STRG	FLOAT ROOF TANKS	CARBON TETRACHLRD
407228	ORGANIC CHEM STRG	FLOAT ROOF TANKS	ACETONE
407232	ORGANIC CHEM STRG	FLOAT ROOF TANKS	ETHYL MERCAPTAN
407816	ORGANIC CHEM STRG	PRESSURE TANKS	ETHANE
407820	ORGANIC CHEM STRG	PRESSURE TANKS	1,3-BUTADIENE
407824	ORGANIC CHEM STRG	PRESSURE TANKS	ACETYLENE
407832	ORGANIC CHEM STRG	PRESSURE TANKS	METHYLAMINE
407848	ORGANIC CHEM STRG	PRESSURE TANKS	ETHYLENE OXIDE
407860	ORGANIC CHEM STRG	PRESSURE TANKS	ETHYL CHLORIDE
407864	ORGANIC CHEM STRG	PRESSURE TANKS	METHYL ISOCYANATE
407872	ORGANIC CHEM STRG	PRESSURE TANKS	METHYL MERCAPTAN
407999	ORGANIC CHEM STRG	MISCELLANEOUS	SPECIFY IN COMMTS
408999	ORGNC CHEM TRNSPT	TANK CARS/TRUCKS	SPECIFY LIQUID
490001	ORGANIC SOLVENT	MISCELLANEOUS	SOLVENT EXTRACTN
490002	ORGANIC SOLVENT	MISCELLANEOUS	SOLVENT RECOVERY
490003	ORGANIC SOLVENT	MISCELLANEOUS	RAILCAR CLEANING
490004	ORGANIC SOLVENT	MISCELLANEOUS	TANK TRUCK CLEANG
490900	ORGANIC SOLVENT	MISCELLANEOUS	INCINERATORS
490999	ORGANIC SOLVENT	MISCELLANEOUS	NOT CLASSIFIED
501001	SOLID WASTE DISPL	GOVERNMENT	MUNICIPAL INCIN
501002	SOLID WASTE DISPL	GOVERNMENT	OPEN BURNING DUMP
501005	SOLID WASTE DISPL	GOVERNMENT	OTHER INCINERATOR
501006	SOLID WASTE	GOVERNMENT	FIRE FIGHTING
501007	SOLID WASTE DISPL	GOVERNMENT	SEWAGE TREATMENT
501900	SOLID WASTE DISPL	GOVERNMENT	AUX.FUEL/NO EMSNS
502001	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-GENL
502002	SOLID WASTE DISPL	COMMERCL/INSTITNL	OPEN BURNING
502003	SOLID WASTE DISPL	COMMERCL/INSTITNL	APARTMENT INCIN
502005	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-SPCL
502006	SOLID WASTE DISPL	COMMERCL/INSTITNL	LANDFILL DUMP
502900	SOLID WASTE DISPL	COMMERCL/INSTITNL	AUX.FUEL/NO EMSNS
503001	SOLID WASTE DISPL	INDUSTRIAL	INCINERATION
503002	SOLID WASTE DISPL	INDUSTRIAL	OPEN BURNING
503005	SOLID WASTE DISPL	INDUSTRIAL	INCINERATOR
503006	SOLID WASTE DISPL	INDUSTRIAL	LANDFILL DUMP
503007	SOLID WASTE DISPL	INDUSTRIAL	LIQUID WASTE
503008	SOLID WASTE DISPL	INDUSTRIAL	SURFACE IMPOUNDMT
503900	SOLID WASTE DISPL	INDUSTRIAL	AUX.FUEL/NO EMSNS

TABLE F-8. SOURCE CATEGORY CODES FOR U.S. AREA SOURCES

SCC	Category Description
001	Residential Fuel - Anthracite Coal
002	Residential Fuel - Bituminous Coal
003	Residential Fuel - Distillate Oil
004	Residential Fuel - Residual Oil
005	Residential Fuel - Natural Gas
006	Residential Fuel - Wood
007	Commercial/Institutional Fuel - Anthracite Coal
008	Commercial/Institutional Fuel - Bituminous Coal
009	Commercial/Institutional Fuel - Distillate Oil
010	Commercial/Institutional Fuel - Residual Oil
011	Commercial/Institutional Fuel - Natural Gas
012	Commercial/Institutional Fuel - Wood
013	Industrial Fuel - Anthracite Coal
014	Industrial Fuel - Bituminous Coal
015	Industrial Fuel - Coke
016	Industrial Fuel - Distillate Oil
017	Industrial Fuel - Residual Oil
018	Industrial Fuel - Natural Gas
019	Industrial Fuel - Wood
020	Industrial Fuel - Process Gas
021	On-Site Incineration - Residential
022	On-Site Incineration - Industrial
023	On-Site Incineration - Commercial/Institutional
024	Open Burning - Residential
025	Open Burning - Industrial
026	Open Burning - Commercial/Institutional
027	Light Duty Gasoline Vehicles - Limited Access Roads
028	Light Duty Gasoline Vehicles - Rural Roads
029	Light Duty Gasoline Vehicles - Suburban Roads
030	Light Duty Gasoline Vehicles - Urban Roads
031	Medium Duty Gasoline Vehicles - Limited Access Roads
032	Medium Duty Gasoline Vehicles - Rural Roads
033	Medium Duty Gasoline Vehicles - Suburban Roads
034	Medium Duty Gasoline Vehicles - Urban Roads
035	Heavy Duty Gasoline Vehicles - Limited Access Roads
036	Heavy Duty Gasoline Vehicles - Rural Roads
037	Heavy Duty Gasoline Vehicles - Suburban Roads
038	Heavy Duty Gasoline Vehicles - Urban Roads
039	Off Highway Gasoline Vehicles
040	Heavy Duty Diesel Vehicles - Limited Access Roads

(continued)

TABLE F-8 (continued)

SCC	Category Description
041	Heavy Duty Diesel Vehicles - Rural Roads
042	Heavy Duty Diesel Vehicles - Suburban Roads
043	Heavy Duty Diesel Vehicles - Urban Roads
044	Off Highway Diesel Vehicles
045	Railroad Locomotives
046	Aircraft LTOs - Military
047	Aircraft LTOs - Civil
048	Aircraft LTOs - Commercial
049	Vessels - Coal
050	Vessels - Diesel Oil
051	Vessels - Residual Oil
052	Vessels - Gasoline
054	Gasoline Marketed
055	Unpaved Road Travel
056	Unpaved Airstrip LTOs
057	Construction
058	Miscellaneous Wind Erosion
059	Land Tilling
060	Forest Wild Fires
061	Managed Burning - Prescribed
062	Agricultural Field Burning
063	Frost Control - Orchard Heaters
064	Structural Fires
071	Beef Cattle Manure Field Application
072	Dairy Cattle Manure Field Application
073	Hog and Pig Manure Field Application
074	Broiler Chicken Manure Field Application
075	Other Chicken Manure Field Application
076	Anhydrous Ammonia Fertilizer Application
077	Beef Cattle Feed Lots
078	Degreasing
079	Drycleaning
080	Graphic Arts (Printing)
081	Rubber and Plastics Manufacturing
082	Architectural Coating
083	Auto Body Repair
084	Motor Vehicle Manufacturing
085	Paper Coating
086	Fabricated Metals
087	Machinery Manufacturing
088	Furniture Manufacturing

(continued)

TABLE F-8 (continued)

SCC	Category Description
089	Flat Wood Products
090	Other Transportation Equipment Manufacturing
091	Electrical Equipment Manufacturing
092	Ship Building and Repairing
093	Miscellaneous Industrial Manufacturing
094	Miscellaneous Industrial Solvent Use
095	Miscellaneous Nonindustrial Solvent Use
096	Minor Utility Sources - Coal
097	Minor Utility Sources - Oil
098	Minor Utility Sources - Gas
099	Minor Point Sources

TABLE F-9. SOURCE CATEGORY CODES FOR CANADIAN AREA SOURCES

SCC	Category Description
10101	Gasoline Powered Motor Ve - Light Duty Trucks
10102	Gasoline Powered Motor Ve - Heavy Duty Trucks
10103	Gasoline Powered Motor Ve - Medium Duty Vehicles
10104	Gasoline Powered Motor Ve - Automobiles
10105	Gasoline Powered Motor Ve - Motorcycles
10106	Gasoline Powered Motor Ve - Snowmobiles
10201	Off-Highway Mobile Source - Helicopters
10202	Off-Highway Mobile Source - Helicopter Flight Em
10203	Off-Highway Mobile Source - Jet Aircraft
10204	Off-Highway Mobile Source - Jet Aircraft Flight
10206	Off-Highway Mobile Source - Local Aircraft Fligh
10207	Off-Highway Mobile Source - Piston Engine Aircra
10208	Off-Highway Mobile Source - Piston Engine Inflig
10210	Off-Highway Mobile Source - Piston Transport Inf
10211	Off-Highway Mobile Source - Small Piston Aircraf
10213	Off-Highway Mobile Source - Turboprop Aircraft
10214	Off-Highway Mobile Source - Diesel Oil - Railroa
10215	Off-Highway Mobile Source - Gasoline Outboards
10217	Off-Highway Mobile Source - Motorships Dockside
10218	Off-Highway Mobile Source - Motorships Underway
10220	Off-Highway Mobile Source - Steamship Dockside
10221	Off-Highway Mobile Source - Steamships Underway
10301	Non-Highway Use of Gasoline
10501	Forest Fires
10601	Slash Burning
10701	Structural Fires
10801	Fertilizer Application
11201	Dry Cleaning
11301	Sand and Gravel Processing
11401	Coal Industry - Coal Handling
11402	Coal Industry - Coal Mining
11403	Coal Industry - Overburden Removal F
11404	Coal Industry - Coal Transportation
11501	Wood Industry - Sawmill Production
11502	Wood Industry - Plywood and Veneer Pro
11503	Wood Industry - Hardwood Production
11504	Wood Industry - Pulpboard Production
11702	Fuel Comb - Stationary So - Elec Pwr - Dist. Oil
11703	Fuel Comb - Stationary So - Elec Pwr - Diesel Tu

(continued)

TABLE F-9 (continued)

SCC	Category Description
11704	Fuel Comb - Stationary So - Elec Pwr - Heavy Oil
11705	Fuel Comb - Stationary So - Elec Pwr - Misc. Dsl
11706	Fuel Comb - Stationary So - Elec Pwr - Natural G
11711	Fuel Comb - Stationary So - Residential Coal
11712	Fuel Comb - Stationary So - Residential Dist. Oil
11713	Fuel Comb - Stationary So - Residential Kerosene
11714	Fuel Comb - Stationary So - Residential Liq. Pet
11715	Fuel Comb - Stationary So - Residential Residual
11721	Fuel Comb - Stationary So - Commercial Coal
11722	Fuel Comb - Stationary So - Commercial Dist. Oil
11723	Fuel Comb - Stationary So - Commercial Kerosene
11724	Fuel Comb - Stationary So - Commercial Liq. Pet.
11725	Fuel Comb - Stationary So - Commercial Natural G
11726	Fuel Comb - Stationary So - Commercial Residual
11731	Fuel Comb - Stationary So - Industrial Coal
11732	Fuel Comb - Stationary So - Industrial Dist. Oil
11733	Fuel Comb - Stationary So - Industrial Kerosene
11734	Fuel Comb - Stationary So - Industrial Liq. Pet.
11735	Fuel Comb - Stationary So - Industrial Natural G
11736	Fuel Comb - Stationary So - Industrial Residual
11740	Fuel Comb - Stationary So - Fuelwood Combustor
11801	Bakeries
12001	Asphalt Production - Asphalt Drying
12002	Asphalt Production - Asphalt Fugitive
12101	Stone Processing - Crush.Stn - Pri.Crushi
12102	Stone Processing - Crush.Stn - Scrn,Cnvy
12103	Stone Processing - Crush.Stn - Sec.Crush&
12104	Stone Processing - Crush.Stn - Sec.Crush.
12111	Stone Processing - Pulv.Stn - Pri.Crushin
12112	Stone Processing - Pulv.Stn - Recrush&Scr
12113	Stone Processing - Pulv.Stn - Scrn,Cnvy&H
12114	Stone Processing - Pulv.Stn - Sec.Crush&S
12115	Stone Processing - Pulv.Stn - Sec.Crush.F
12116	Stone Processing - Pulv.Stn - Fines Mills
12117	Stone Processing - Pulv.Stn - Storage Pil
12121	Stone Processing - Building Stone - Cutt
12501	Clay Products Manufacture - Clay Prod. - Dryer - Gri
12502	Clay Products Manufacture - Clay Prod. - Storage
12601	Grain Handling and Milling - Term.Elev - Cleaning
12602	Grain Handling and Milling - Term.Elev - Drying
12603	Grain Handling and Milling - Term.Elev - Headhouse
12604	Grain Handling and Milling - Term.Elev - Ship & Rec
12605	Grain Handling and Milling - Term.Elev - Transfer C

(continued)

TABLE F-9 (continued)

SCC	Category Description
12606	Grain Handling and Milling - Term.Elev - Tripper(Ga
12613	Grain Handling and Milling - Prim.Elev - Headhouse
12614	Grain Handling and Milling - Prim.Elev - Ship & Rec
12615	Grain Handling and Milling - Prim.Elev - Transfer C
12623	Grain Handling and Milling - Xfer.Elev - Headhouse
12624	Grain Handling and Milling - Xfer.Elev - Ship & Rec
12625	Grain Handling and Milling - Xfer.Elev - Transfer C
12626	Grain Handling and Milling - Xfer.Elev - Tripper(Ga
12641	Grain Handling and Milling - Proc.Elev - Cleaning H
12642	Grain Handling and Milling - Proc.Elev - Millhouse
12643	Grain Handling and Milling - Proc.Elev - Preclean &
12644	Grain Handling and Milling - Proc.Elev - Receiving
12701	Natural Gas Processing - Compressor Engin. Non
12702	Natural Gas Processing - Compressor Turb. Non
12703	Natural Gas Processing - Compressors In-Plant
12704	Natural Gas Processing - Heaters Boilers In-P
12705	Natural Gas Processing
12801	Solid Waste Incineration - Wood Waste Disposal
12802	Solid Waste Incineration - Controlled Air
12803	Solid Waste Incineration - Multiple Chamber
12901	Diesel and Gasoline Marketi - Filling Vehicle Tank
12902	Diesel and Gasoline Marketi - Refinery Storage Tra
12903	Diesel and Gasoline Marketi - Spillage at Station
12904	Diesel and Gasoline Marketi - Station Storage Tran
12905	Diesel and Gasoline Marketi - Transfer to Cars
12906	Diesel and Gasoline Marketi - Vapor Loss at Statio
12907	Diesel and Gasoline Marketi - Diesel Evaporation
13001	Application of Surface Co - Industrial Use
13002	Application of Surface Co - Trade, Sales Use
13101	Landfill Sites
13201	Ferrous Foundries - Cupola Furnace (Hot
13202	Ferrous Foundries - Cupola(+1 Reverb.) Fu
13203	Ferrous Foundries - Electric Arc Furnace
13204	Ferrous Foundries - Induction Furnace (H
13205	Ferrous Foundries - Rotary Oil Furnace (H
13701	Dust from Unpaved Roads - Trucks Earth Roads
13702	Dust from Unpaved Roads - Trucks Treated Grave
13703	Dust from Unpaved Roads - Trucks Untreated Gra
13704	Dust from Unpaved Roads - Vehicles Earth Roads
13705	Dust from Unpaved Roads - Vehicles Treated Gra
13706	Dust from Unpaved Roads - Vehicles Untreated G
13901	Concrete Batching
13902	Concrete Batching - Fugitive (Material H
14001	Cigarette Smoking
14101	Crude Oil Production - Evaporation from Shi
14102	Crude Oil Production - Evaporation

(continued)

TABLE F-9 (continued)

SCC	Category Description
14201	Mining and Rock Quarrying - Concentrate Dryers
14202	Mining and Rock Quarrying - Concentrate Transpor
14203	Mining and Rock Quarrying - Open Pit Mining
14204	Mining and Rock Quarrying - Overburden Removal F
14205	Mining and Rock Quarrying - Under Ground Mining
14401	Tire Wear
14501	Pesticide Application
14601	Diesel Powered Engines - Agriculture Diesel V
14602	Diesel Powered Engines - Construction Vehicle
14603	Diesel Powered Engines - Heavy Duty Vehicles
14604	Diesel Powered Engines - Other Industrial Eng
14701	Plastics Fabrication
14801	Agriculture - Wind Erosion of Crop
14802	Agriculture - Fugitive Tilling Emi
14901	Tailing Piles Erosion
15001	Construction Sites - Bridges, Tunnels, Roads
15002	Construction Sites - Heavy Construction
15003	Construction Sites - Non-Residential Cons
15004	Construction Sites - Residential Construc
15005	Construction Sites - Water,Sewer,Utility
15101	General Solvent Use
15201	Dust from Paved Roads - Trucks
15202	Dust from Paved Roads - Vehicles